DECEMBER 1941 Thirty-Five Cents Per Copy

Coal Age

Volume 46 Number 12

Passage of the federal inspection law has brought the subject of coal-mine safety farther into the limelight. What the law means and how it will operate therefore are the major items in a special safety section beginning on p. 63 of this issue. . . . **Most injuries** and fatalities in coal mines result from a relatively few types of accidents. What these accidents mean in terms of coal-miner deaths and suggestions on how to stop them consequently are included in the safety section, along with an initial list of recommendations of the Mine Safety Board of the U. S. Bureau of Mines and other material bearing on safety. . . . **Domestic sizes,** normally the cream of the crop, usually get a good break in any preparation set-up. In the new Consolidation No. 32 plant, however, special facilities are provided for removing and re-treating soft, stained and bony material. Other features (see pp. 45-51) include complete equipment for stoker production and blending. . . . **Welding** is accepted as an indispensable maintenance tool at coal mines, but how about its use in construction? C. S. Roach, International - Stacey Corporation, thinks it would be fine in

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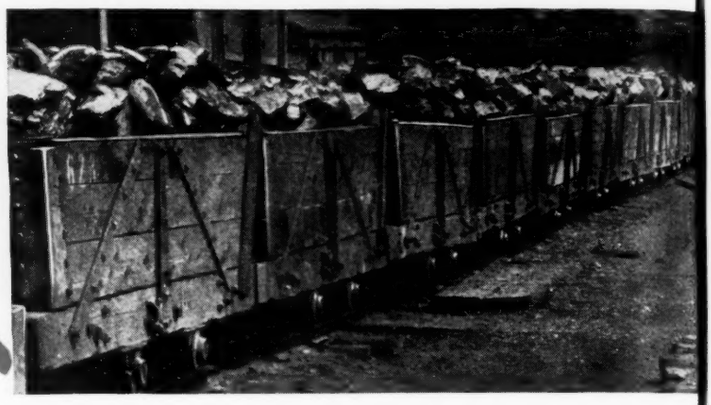

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FOR THE COAL MINING INDUSTRY

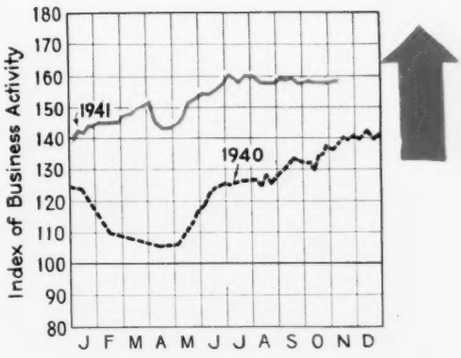
(CONTINUED FROM PAGE 5)

building preparation plants. His analysis of welding in such applications has been readied for early publication. . . . **Starting** a man off with the proper habits insures a good workman. Why good working habits are important and how to create them is the subject of the fourth in the O. G. Van Campen series (p. 52). . . . **Certain** electrical loads at coal mines sometimes turn out to be hard to handle. Consider, for example, picking up a heavy across-the-line d.c. pump load after a circuit-breaker operation. Such a problem was solved at a Sterling Coal Co. mine in Pennsylvania by installing special equipment to reduce the voltage for a few seconds after the breakers reclosed and thus insure smooth pump starting and elimination of flash peaks on m.g. sets. Details are set forth in an article scheduled for an early issue. . . . **Power factor,** too, will be analyzed further in a coming number, when Fred Richart will tell how Illinois mines go about improving it. Reasons for improvement are detailed in the second in his series in this issue (p. 54). . . . **Other items** on the *Coal Age* agenda include a description of how the Pittsburg & Midway Coal Mining Co. adopted jig washing of large coal, revised dewatering and settling facilities and otherwise modernized its West Mineral (Kan.) plant. . . . **Institute** meets bulked large in activities in late October and November. For summaries of the proceedings at five such sessions, see news section in this issue.

HOW'S BUSINESS

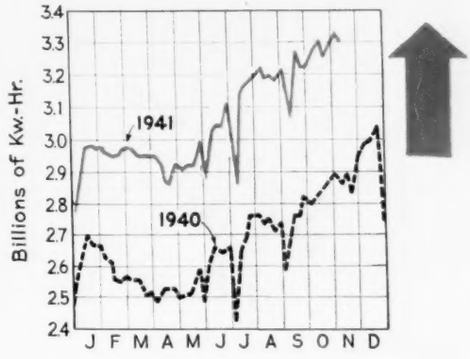
GENERAL BUSINESS CONDITIONS

Developments in the war, the captive mine issue and stricter allocation of critical materials to both defense and non-defense industries have tended to confuse the business outlook. Introduction of new plants into defense operations, however, is expected within a few months to lift production from the three-point range shown by the *Business Week* Index of the last 21 weeks (at 159.7 in the issue of Nov. 15). Employment continues to advance to new highs.



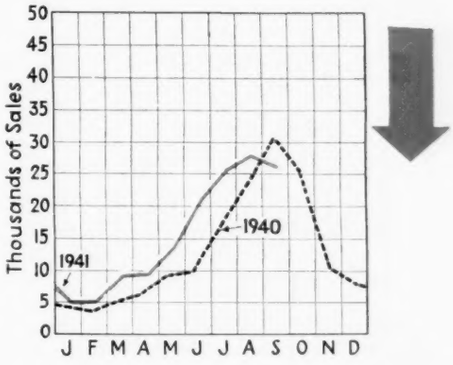
ELECTRICAL POWER OUTPUT

Production of energy by the electric light and power industry totaled 3,325,574,000 kw.-hr. for the week ended Nov. 8, a decrease of about 13,000,000 kw.-hr. from the preceding week, due to the election day holiday, but was 16.4 per cent above that of the corresponding week a year ago. Figures for other recent weeks, according to the Edison Electric Institute, are: Oct. 18, 3,273,000,000 kw.-hr.; Oct. 25, 3,299,000,000; Nov. 1, 3,338,000,000 kw.-hr.



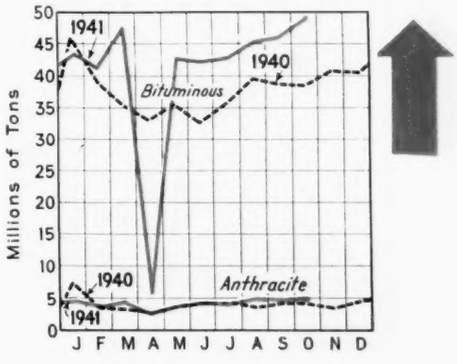
COAL STOKER SALES

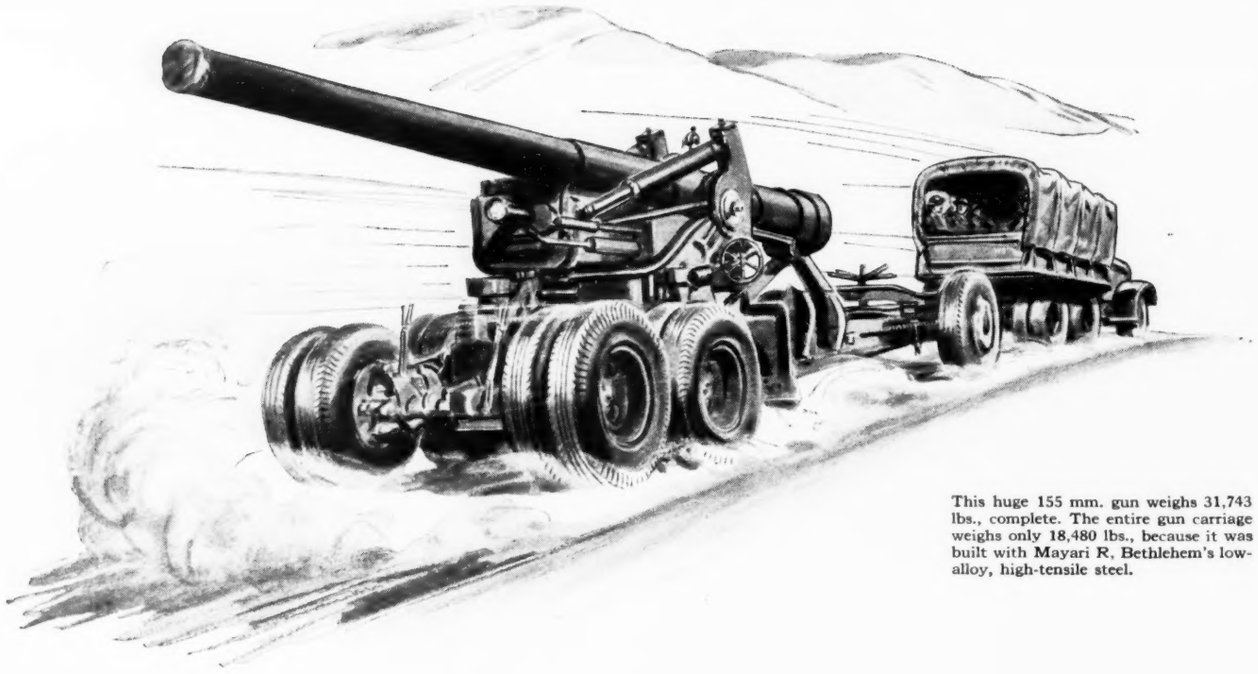
Mechanical stoker sales in the United States in September last totaled 27,138 units (U. S. Bureau of the Census from 101 manufacturers), compared with 28,731 (revised) in the preceding month and 31,396 in September, 1940. Sales of small units in September last were: Class 1 (under 61 lb. of coal per hour), 24,767 (bituminous, 22,822; anthracite, 1,945); Class 2 (61–100 lb. per hour), 1,077 (bituminous, 1,009; anthracite, 68); Class 3 (101–300 lb. per hour), 876.



COAL PRODUCTION

Bituminous coal produced by United States coal mines in October last (preliminary) totaled 49,800,000 net tons, according to the Bituminous Coal Division, U. S. Department of the Interior. This compares with 46,880,000 tons (revised) in the preceding month and 38,700,000 in October, 1940. Anthracite tonnage in October last, according to the U. S. Bureau of Mines (preliminary), was 5,382,000, against 5,143,000 (revised) in the preceding month and 4,355,000 tons in October, 1940.





This huge 155 mm. gun weighs 31,743 lbs., complete. The entire gun carriage weighs only 18,480 lbs., because it was built with Mayari R, Bethlehem's low-alloy, high-tensile steel.

More maneuverable...

BECAUSE OF MAYARI R

Here's one of more than a hundred new 155 mm. guns now being built for our army. It is 40 ft. long from end to end, is 8 ft. 7 in. high, and can hurl 100-lb. shells 26,000 yards—almost 15 miles.

A gun as big as this might be expected to be extremely difficult to move quickly from one point to another. Yet, actually, it is remarkably maneuverable and can be towed behind an army truck at high speeds. This is largely the result of building the entire gun, except for barrel and recoil mechanism, with weight-saving Mayari R. Use of this stronger, more corrosion-resistant steel has made possible construction with thinner, lighter sections without danger of damage by shock, impact, or corrosion.

Adaption of Mayari R to military use is uncovering new applications, new performance and production data, and is emphasizing the broad-range adaptability of this high-strength steel.

Mayari R's advantages at a glance

Yield point, 50,000 p.s.i.—almost double that of mild carbon steel.

Corrosion resistance five to six times that of mild carbon steel, two to four times that of copper-bearing steel.

Strength plus corrosion resistance makes possible weight savings up to 40 per cent.

Remarkable resistance to impact even at low temperatures.

Highly ductile—easily fabricated under regular shop practices.

Readily welded by all usual methods. Non-air-hardening. No heat treatment necessary.

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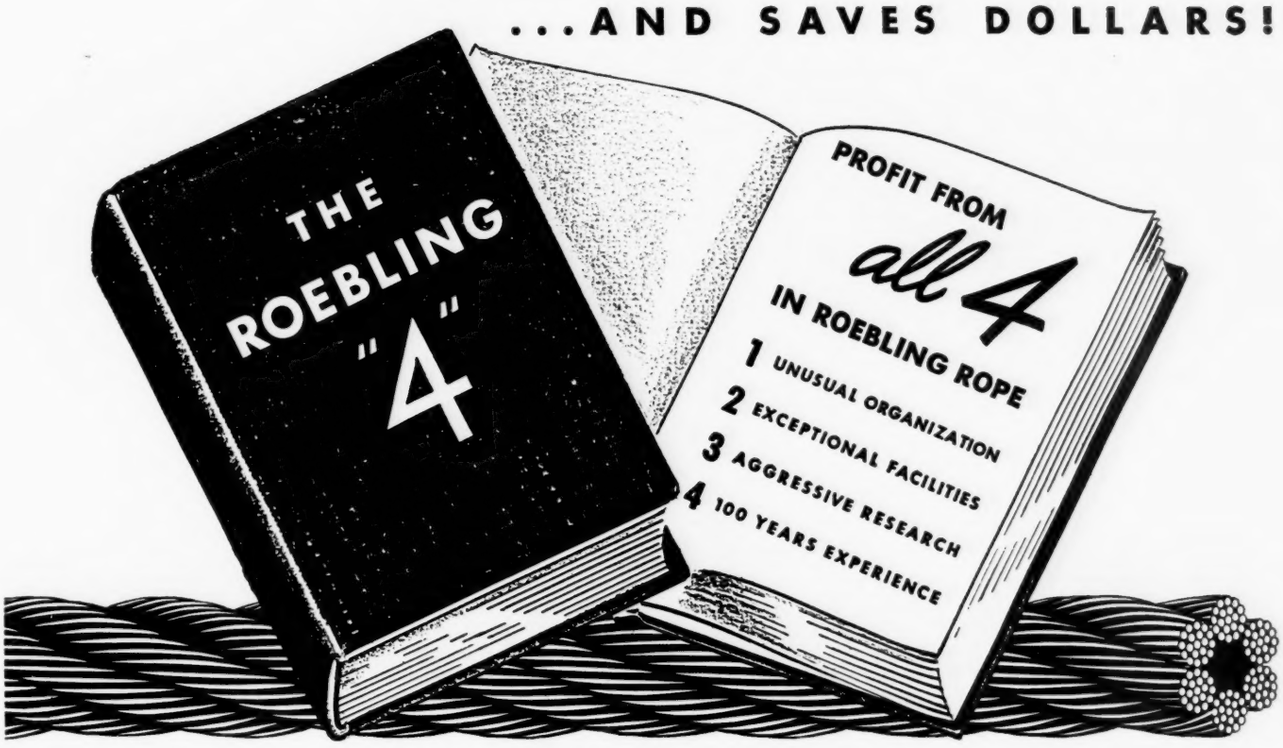
A WIRE ROPE STORY THAT MAKES SENSE

...AND SAVES DOLLARS!



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"Blue Center" STEEL

WIRE ROPE

PREFORMED AND NON-PREFORMED

Roebling leaves no stone unturned to give you the finest in wire rope. In Roebling "Blue Center" Steel Wire Rope you get the benefit of a combination of advantages obtainable nowhere else. It's a combination we call the "Roebling 4".

Service record after service record has proved that on the basis of *general average* rope operating cost, Roebling "Blue Center" Steel Wire Rope saves money —gives unexcelled performance!

A JOB ENTRUSTED TO ROEBLING VETERANS!

Drawing the wire for Roebling "Blue Center" Steel Wire Rope is a job that calls for great skill and painstaking care.

Most Roebling wire drawers have had from 10 to 35 years of experience!

In Roebling Wire Rope you get the benefit of the extra quality built into the rope by an organization whose skill and experience is unsurpassed.

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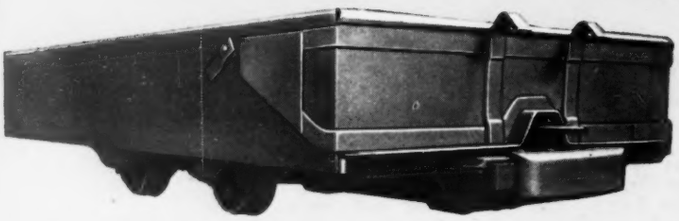
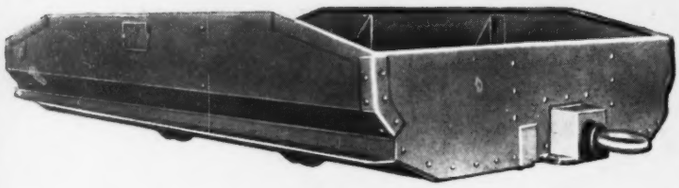
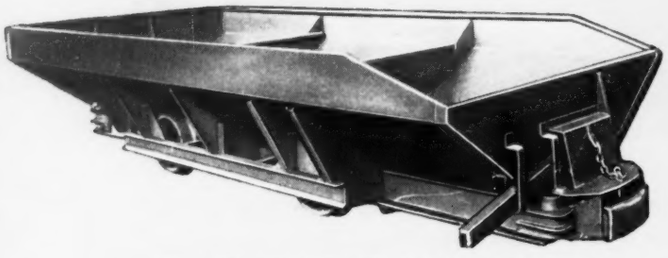


Electrically Welded End Dump Car

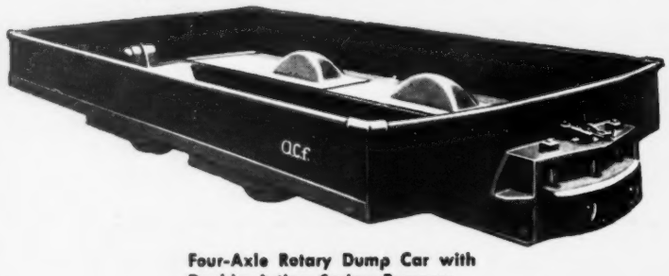
Electrically Welded Car for Rotary Dump



Car for Rotary Dump

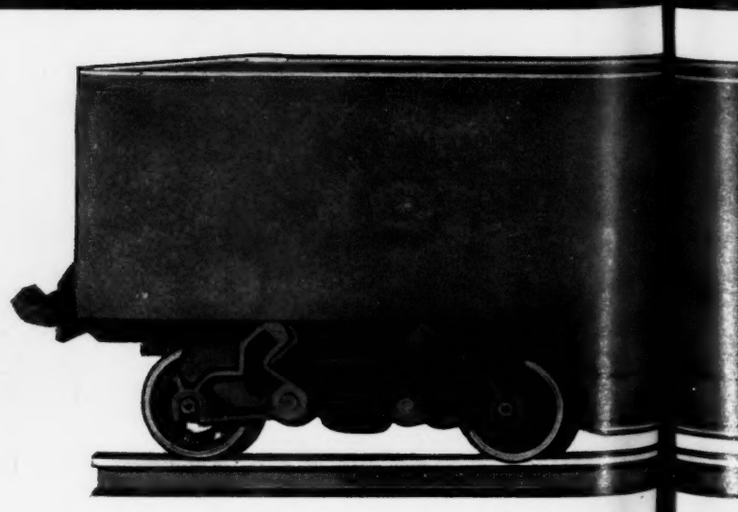


Large Capacity Automatic Drop Bottom Car



Four-Axle Rotary Dump Car with
Double Acting Spring Bumpers

acf



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New trucks with modern bearings will very likely make your old cars operate better than when new. The reason for this is that about 90% of all new cars made today, and all modern trucks, are equipped with anti-friction bearings. We can supply wheels quite promptly, and all other parts . . . such as, complete trucks, axles, bumpers, electrically welded end sill construction with spring bumpers, or complete cars . . . just as quickly as materials can be obtained. If you need parts, or complete cars, place your order now.

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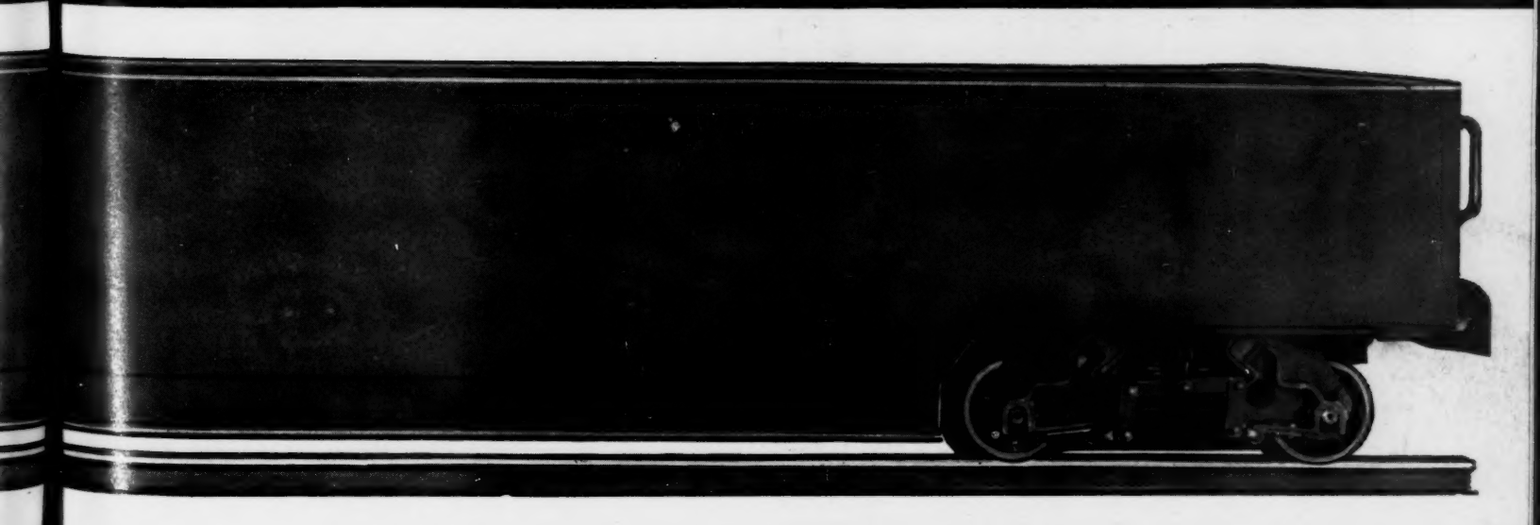

10 or more tons capacity Eight Wheel Mine Car

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a Rugged Power Cable

A rubber armored, moistureproof underground cable, which may be laid directly in a trench without conduit, or run through pipe, or hung on insulators inside the mine.

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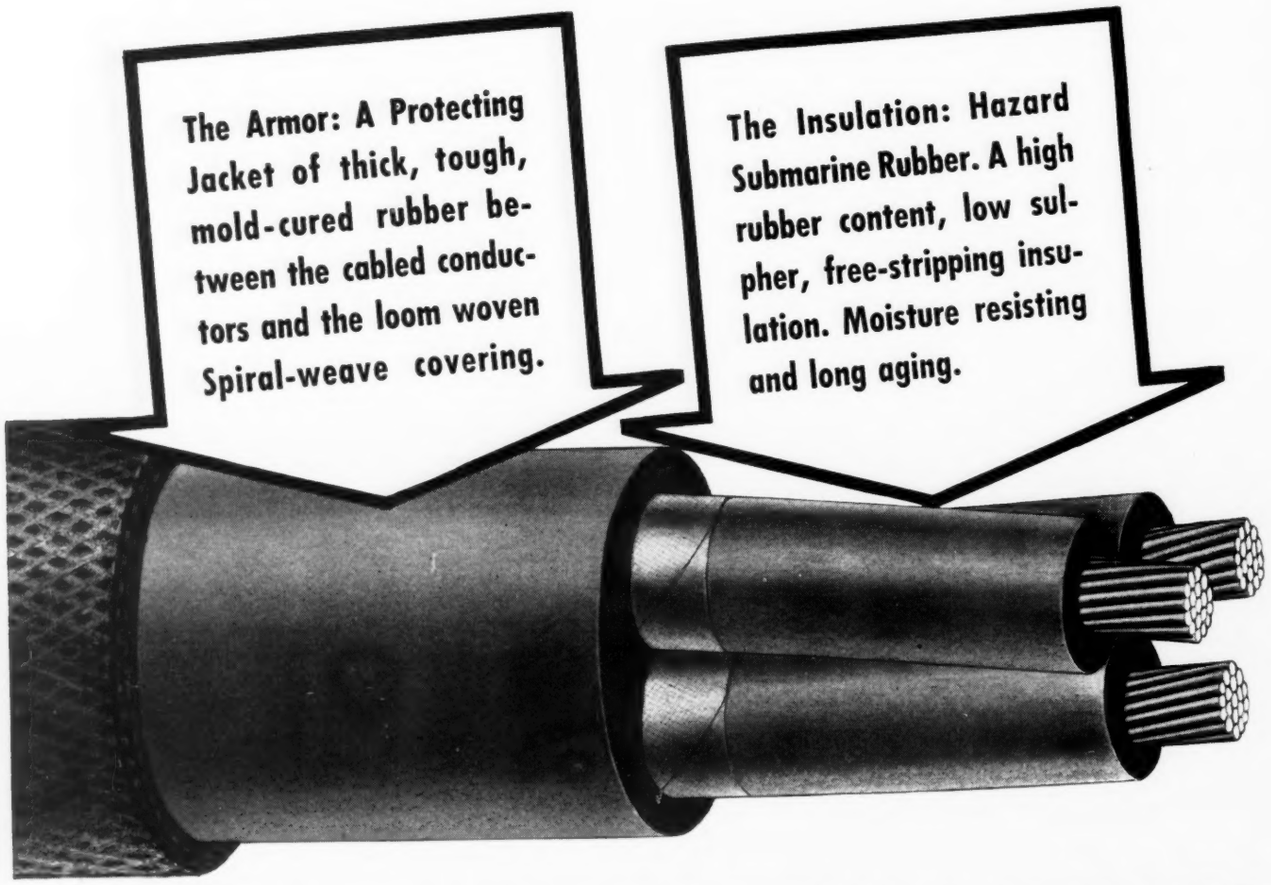
The Armor: A Protecting Jacket of thick, tough, mold-cured rubber between the cabled conductors and the loom woven Spiral-weave covering.
The Insulation: Hazard Submarine Rubber. A high rubber content, low sulpher, free-stripping insulation. Moisture resisting and long aging.

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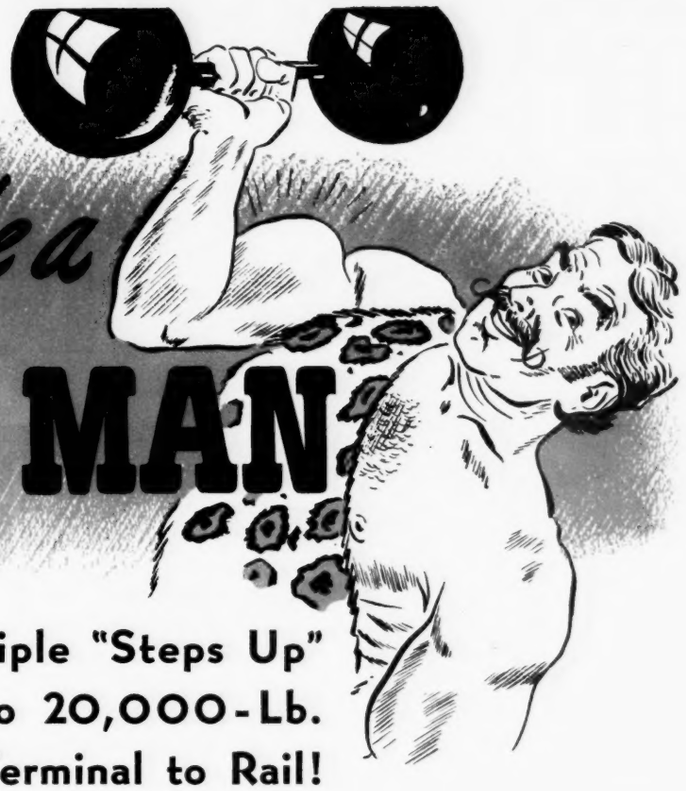

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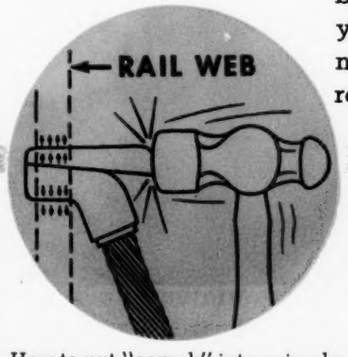
O-B Wedge Bond Principle "Steps Up" Simple Hammer Blow to 20,000-Lb. Pressure—"Coldwelding" Terminal to Rail!

You don't have to clip any coupons or send for ten easy lessons to be a "strong" man when it comes to rail bonding!

No sir! All you have to do is enter a trial order for O-B Wedge Bonds and see for yourself how the age-old application principle of this new bond puts zip into your muscle — new life into your return circuit.



How to put "oomph" into a simple hammer blow! The Wedge Bond application principle develops 20,000 lbs. of expansion pressure, effectively "coldwelding" the bond terminal to the rail.

Two or three blows with an ordinary hammer will develop 20,000 lbs. of expansion pressure —effectively "coldwelding" the bond terminal to the rail—forming a perfect, permanent mechanical and electrical joint.

Simple, easy-to-install, easy-to-reclaim, yet absolutely dependable! What more can you demand of a rail bond? Ask your O-B representative or write to Mansfield, Ohio, for additional information about this new, modern bonding system.

1. 60-Second Installation
2. Easy, Multiple Reclamation
3. All-Copper, Low Resistance Path
4. Meets Mechanical Mining Needs
5. Easy, Positive Visual Inspection
6. No Special Tools After Rail Is Drilled
7. Permanent Mechanical and Electrical Joint
8. 20,000-Lb. Pressure, "Coldwelds" Terminal to Rail

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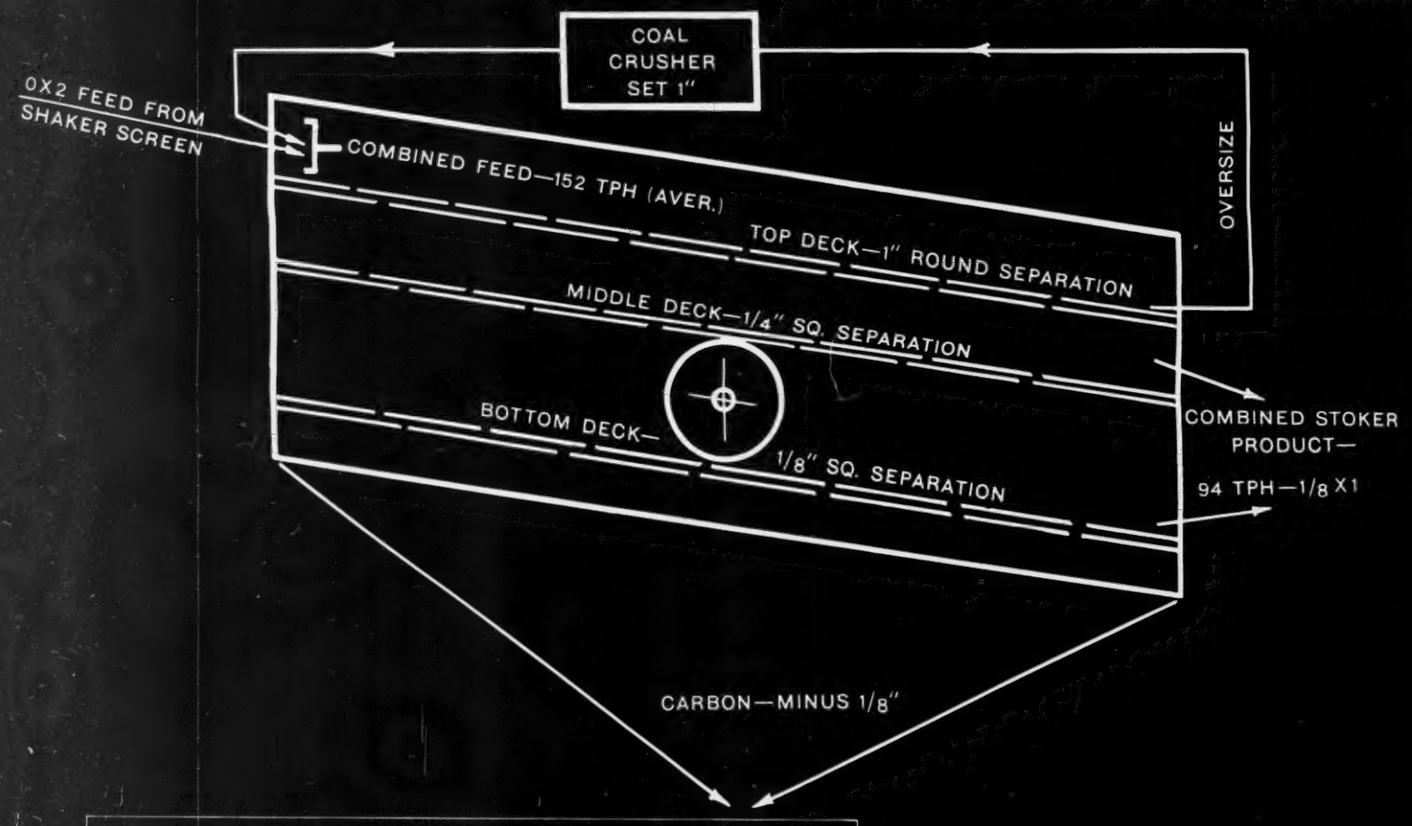
MANSFIELD OHIO · U · S · A

Canadian Ohio Brass Company, Ltd. Niagara Falls, Ont., Canada

RIPL-FLO SCREEN INCREASES REVENUE



ABOVE
Sketch of flow sheet at Bell Coal Co. Although at present the product of the two lower decks is combined to give 1/8x1 stoker, they can just as easily produce both 1/4x1 and 1/8x1/4 stoker coal with their Allis-Chalmers Ripl-Flo.

LEFT
$40 extra revenue per hour . . . an average feed of 152 TPH . . . less than half ordinary power consumption — that's what this 6′x14′ triple-deck Allis-Chalmers Ripl-Flo Screen is doing for Bell Coal Co., Rella, Ky.

Let ALLIS-CHALMERS COOPERATIVE

$40.00 PER HOUR!

Bell Coal Co. Averages 152 TPH Feed, with Separation at 1/8" Square Opening . . . Converts Extra 32 TPH from Carbon to Stoker! Here is a Typical Example of How Allis-Chalmers Cooperative Engineering Can Work for You!

How would you like to have your operating revenue increased $40 per hour?

That's what Bell Coal Co., Rella, Ky., is getting since they installed a new Allis-Chalmers 6'x14' triple-deck Ripl-Flo Screen. Here's how . . .

As in other mines, some of their coal comes from water holes, and the carbon separated contains as high as 5.7% moisture. This high moisture content, coupled with the many thin flakes, makes the coal difficult to screen.

But Ripl-Flo's uniform circle throw overcomes the tendency of the material to stick together . . . *rolls* it over and over . . . actually screens an average of 152 TPH, with peak loads up to 193 TPH!

And because they're making a 1/8" square separation on the bottom deck, Bell Coal Co. gets *34% (below 1/4") extra stoker product* that would pass through an ordinary screen as carbon. Averaging 94 TPH of stoker, which contains only 2% less than 1/16" square product, this means they're reclaiming an extra 32 TPH. At the prevailing price differential of $1.25 per ton, this adds up to an *increase in revenue of $40 per hour!*

What's more, the Ripl-Flo, with all superfluous parts eliminated, *requires only 6 hp* to operate, against the 15-20 hp for other screens! It's easy to see why Bell Coal Co. recently ordered two more identical Ripl-Flo Screens.

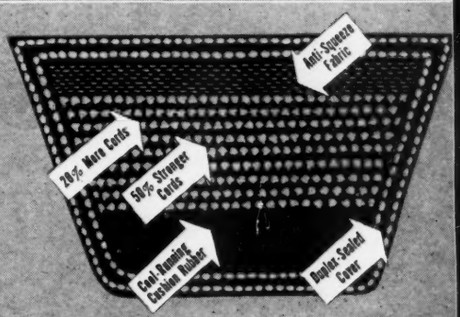
This is just one example of how Allis-Chalmers Cooperative Engineering works in the coal industry. With their vast background of experience and service, our engineers can work with your own staff . . . give you the *right* machine for the job you want done.

The next time a screening problem comes up at your mine, why not call in an Allis-Chalmers engineer from the district office near you? Let him show you how Cooperative Engineering can help you.

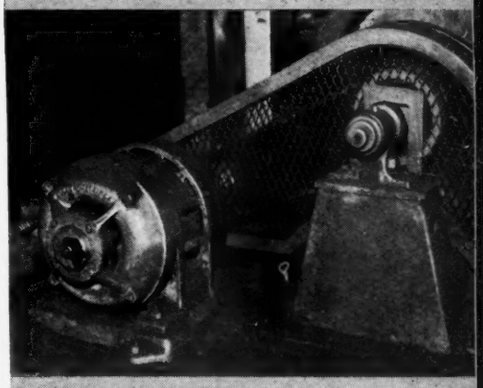
A-1462

ENGINEERING *Cut your costs*

News of other Allis-Chalmers Products that cut your costs!



ANNOUNCING—THE NEW TEXROPE SUPER-7, the best V-belt ever built by Allis-Chalmers! 50% stronger cords . . . 20% more cords . . . new, cooler-running cushion rubber . . . duplex-sealed cover —all add up to longer belt life!



WHERE OPERATING CONDITIONS are worst, Allis-Chalmers Lo-Maintenance Motors . . . built for more than just a rated horsepower . . . are at their best. Here a 7½ hp high-torque motor drives a blower in a West Virginia cleaning plant.

Don't Wait Until the Last Minute . . . Because of the difficulty in obtaining raw materials, coupled with the heavier demands placed upon our manufacturing facilities, delivery schedules have naturally been lengthened. Hence, while we are producing more machinery for the coal industry than ever before in our history, we earnestly advise all companies planning modernization or expansion programs to place their orders as quickly as possible to insure delivery when needed.

Jeffrey

GENUINE RENEWAL PARTS

In them you will find plus values derived by *DISCRIMINATING SELECTION OF METALS . . . PROPER HEAT TREATMENT . . . PRECISION MANUFACTURE . . . CAREFUL INSPECTION.* Your guarantee of "better" in Jeffrey Renewal Parts is under-written by experience accumulated through sixty years.

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THE JEFFREY MANUFACTURING CO.

COLUMBUS • OHIO

MINING AND MATERIAL HANDLING SPECIALISTS SINCE 1877

A tremendous trifle
trebles power cable life . . .

An achievement of Anaconda research benefiting both American Industry and Defense

IT IS Anaconda's new construction known as Type CB*. It was born in the Anaconda laboratories when an engineer applied the principle of conditioning oil by the introduction of carbon black, in a series of experiments then being carried on.

This principle, when applied to paper-insulated oil-impregnated cable, more than trebled the life of the cable under accelerated aging tests.

The resourceful research that made this vast improvement in power cable continues unabated by the emergency. In fact, daily it strives to produce better wires and cables not only for all-important defense purposes, but also for industry at large. And although the latter may be delayed in obtaining new and improved products, when peace comes these products will be ready to go to work in the constructive cause of greater industrial progress. 41376

• • •

ANACONDA WIRE & CABLE COMPANY
General Offices: 25 Broadway, New York City
Chicago Office: 20 North Wacker Drive
Subsidiary of Anaconda Copper Mining Company
Sales Offices in Principal Cities

ANACONDA
from mine to consumer

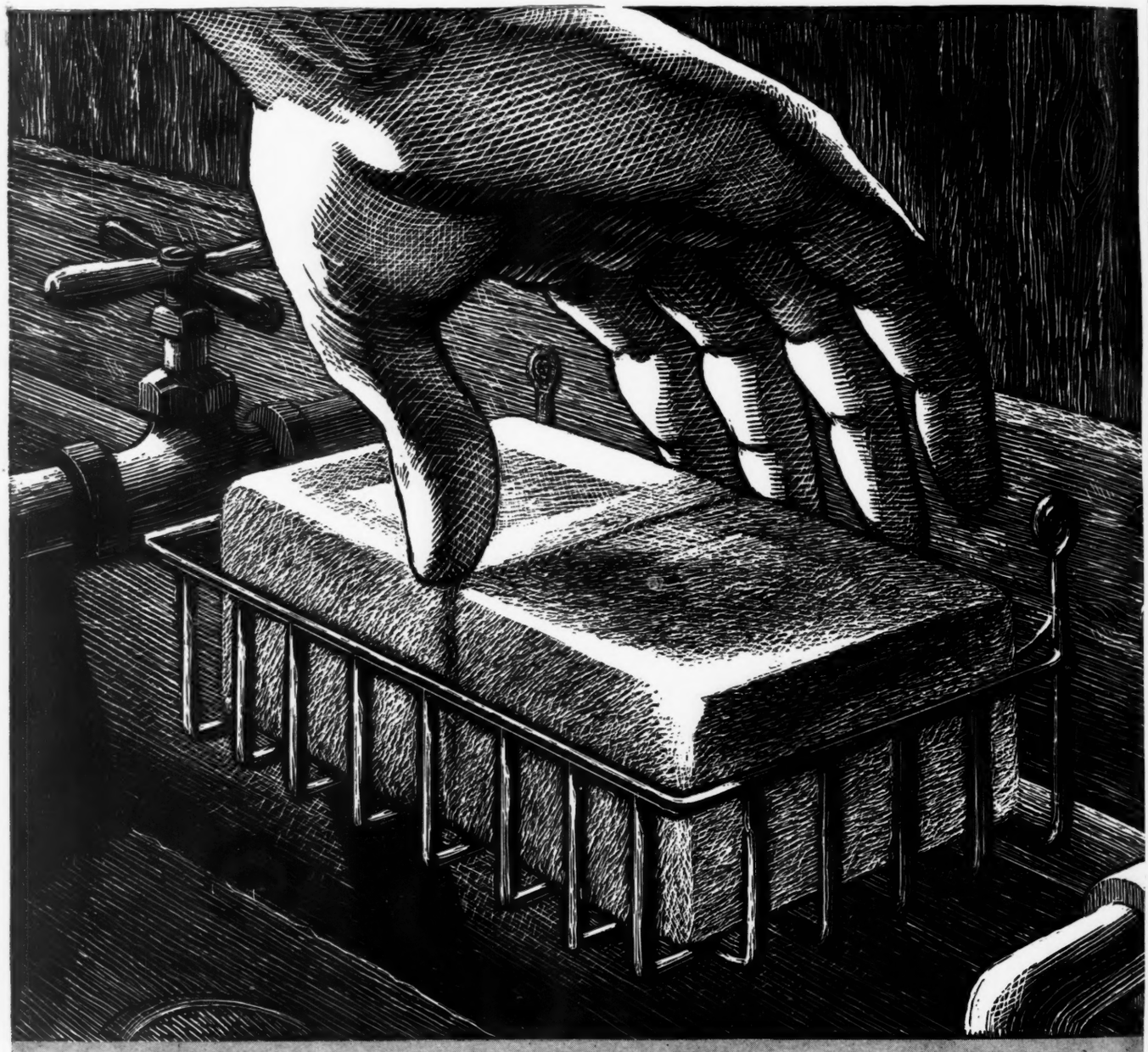
This familiar trademark identifies Anaconda products. It symbolizes the best efforts of man and science.

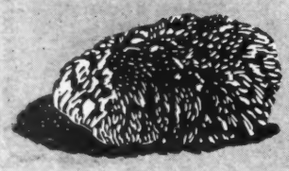
* Reg. U. S. Pat. Off.

ELECTRICAL WIRES AND CABLES OF COPPER ARE THE LIFE LINES OF OUR NATION

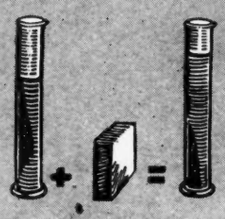
ANACONDA WIRE AND CABLE

ANTI-FRICTION BEARINGS . . . .





Just as a sponge controls the water it has absorbed, so is soap a thickening agent which controls the flow of the lubricant to the bearings.



Maximum economical lubrication per pound of grease is assured by the use of cylinder oil, making a minimum of soap necessary.

ARE NO LONGER "SOAP DISHES"

after changing to TYCOL GREASES

Anti-friction bearings were so caked with soap deposits from easily broken down grease that they could pass for "soap dishes." This accumulation of old, hard, soapy grease prevented the entrance of new lubricant, caused costly damage to the roller bearings from lack of proper lubrication. But the bearing "soap dish" era has gone and bearing worries are ended now that this mine is using Tycol Grease.

Why do Tycol Greases stand up in tough lubricating jobs where other greases soon run out or separate to form hard soap deposits? It's because Tycol Greases are made from the highest quality lubricating oils combined with a minimum of soap for a given consistency. Tycol Grease is water repellent, "stays put" indoors and out.

A Tide Water engineer will gladly help you maintain maximum production through proper lubrication. Full details may be obtained by writing the Tide Water Associated Oil Company, 17 Battery Place, New York, N. Y.

Regional Offices: Boston, Philadelphia, Pittsburgh, Charlotte, N. C.

TIDE WATER ASSOCIATED OIL COMPANY

EASTERN DIVISION

17 Battery Place • New York, N. Y.

DRUMS, DRUMS, DRUMS!
Defense needs make it extremely important that all empty drums be returned immediately.

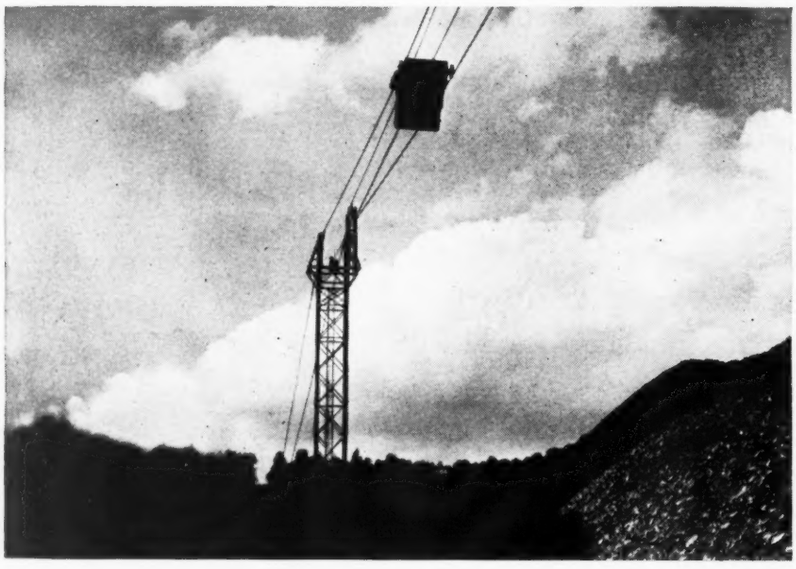
Veedol Motor Oil is another well-known product of the Tide Water Associated Oil Company

INDUSTRIAL TYCOL OILS-GREASES

Tycol Green Cast Greases are made of paraffine stock cylinder oil which has high flash and fire points, with maximum film strength.

TIDE WATER GREASES

Interstate's 5th Refuse Disposal Tramway for The New River Company



The New River Company at Mt. Hope, W. Va., was confronted by the fact that, after 12 years operation, the refuse dump at their Summerlee Mine had reached the tail tower of an existing Interstate Tramway—and a new installation was needed—quickly.

Another Interstate Tramway was immediately ordered, to provide for 20 years mine output; rapidity of construction was as important as dependability and economy in operation. Simply another *proof* that

Special Features of INTERSTATE Disposal Tramways

1 Large capacity carriers supported by six wheels, travelling on two cables forming one track.
2 Original design of self-dumping cars with adjustable door tripping mechanism arranged to discharge cars in motion.
3 Strongly built carriers of corrosion and acid resistant alloys.
4 Tramway drive drums with integral helical steel gears and high torque pneumatic and hydraulic brakes.
5 Simple and effective arrangement of brake mechanism.
6 Automatic loading with self-closing gates.
7 Automatic loading with batch weigh hoppers and motor driven feeders functioning under electric control.
8 Traveling weigh hoppers to load tramcars at points remote from tipple bins.
9 All steel construction of terminal and tower supports.
10 Towers of pivoted base design for automatic adjustment of track cable tensions under varying load conditions.

• *Experienced Operators Select Interstate Tramways*

The New River Co., producing 4,200,000 tons of coal a year, has had substantial experience with Interstate Tramway efficiency. Beginning in 1928, they have now invested in 5 Interstate Tramways. This newest installation serves their 658 ft. Summerlee Shaft, is 2,665 ft. long and is geared to handle an average of 175 cars of rock per 6 hours of operation. Its profitable service life is figured on mine life basis—and when we predict that it will make good, we speak from experience. This year Interstate Tramways are being installed in faraway Java, Hawaii, Alaska—as well as in the coal fields of Pennsylvania, West Virginia, Kentucky and Tennessee.

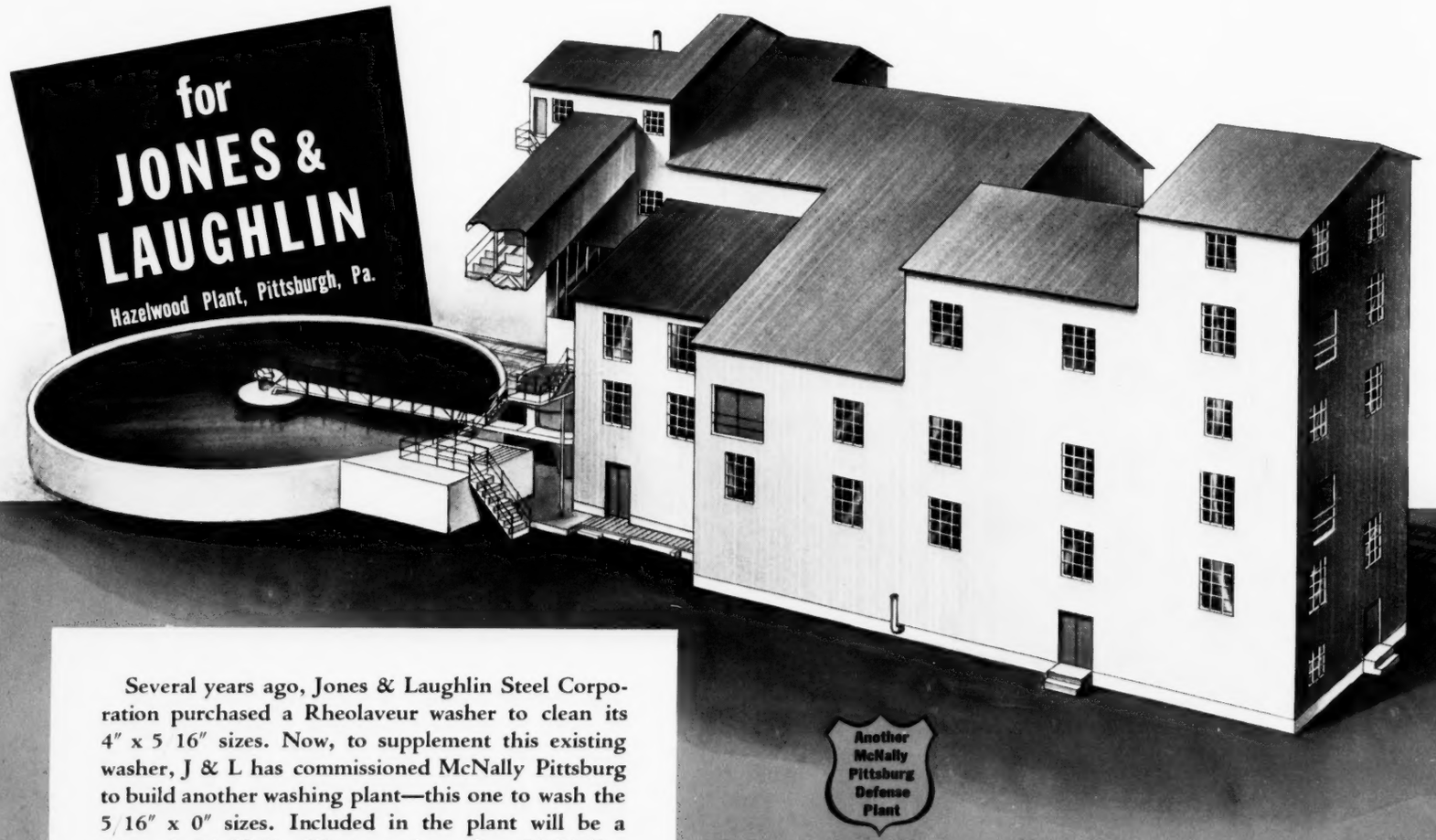
INTERSTATE ENGINEERS ARE AT YOUR SERVICE

• *Your disposal problems*

Your problems of Coal Haulage and Mine Waste Disposal can be solved with certainty by INTERSTATE SERVICE and EQUIPMENT. Write for our special Booklet, giving photos, diagrams, capacity tables and other data on different types of Aerial Tramway equipment.

INTERSTATE EQUIPMENT CORPORATION
18 W. JERSEY ST. ELIZABETH, N. J.

New McNally-Rheo Washing Plant

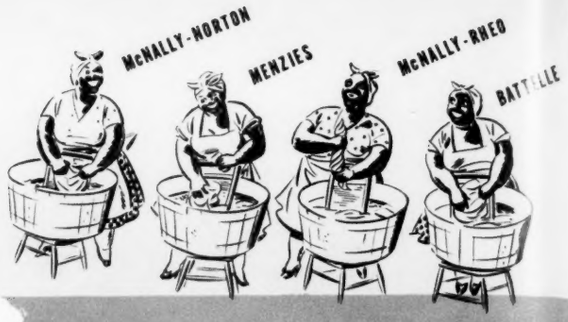


Several years ago, Jones & Laughlin Steel Corporation purchased a Rheolaveur washer to clean its 4″ x 5 16″ sizes. Now, to supplement this existing washer, J & L has commissioned McNally Pittsburg to build another washing plant—this one to wash the 5/16″ x 0″ sizes. Included in the plant will be a 160-tph McNally-Rheo washer, five McNally-Carpenter driers, and a Dorr thickener for water clarification. A continuous filter will recover the sludge. The plant will be a complete McNally Pittsburg job—including design, manufacture, and erection.

Another McNally Pittsburg Defense Plant

McNALLY PITTSBURG

SPECIALISTS IN COAL PREPARATION



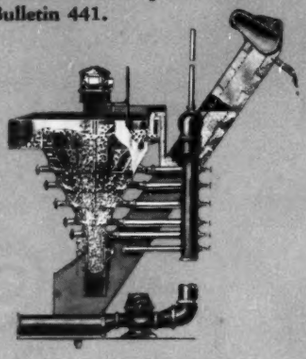
ONE of these FOUR WASHERS

is exactly suited to your needs

1 McNALLY-NORTON *Patented* Automatic Washer

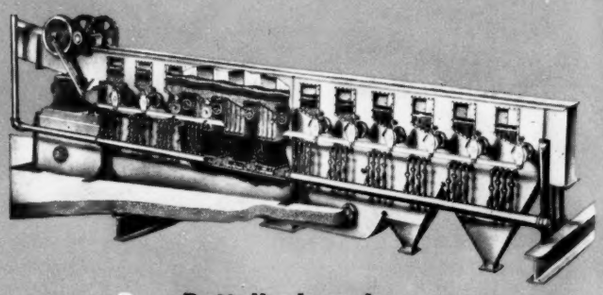
This unit is definitely established as America's favorite coal washer. It provides clean-cut separation of refuse from coal so that a minimum of coal is lost in the refuse. The ash content of the output remains uniform, regardless of variations in the raw coal feed. Handles all sizes up to eight inches in one washer. The McNally-Norton is known for its trouble-free operation and low operating costs. Write for Bulletin 441.

2 Menzies Cone Separator

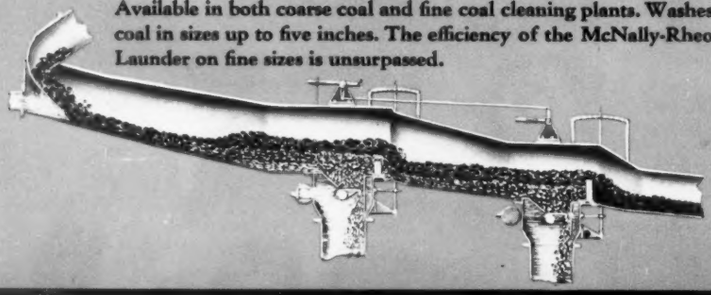


In this unit, upward water currents introduced by a series of nozzles in a cone separate coal and refuse. Particularly adapted for use on bituminous coal for $\frac{1}{16}$" plus sizes and on finer sizes in anthracite.

3 McNally-Rheo Launder



Available in both coarse coal and fine coal cleaning plants. Washes coal in sizes up to five inches. The efficiency of the McNally-Rheo Launder on fine sizes is unsurpassed.



4 Battelle Launder

Coal and refuse are separated in a flowing stream of water. Refuse is removed by rotating gates. This system is particularly adapted for cleaning fine coal ⅜" or smaller and is unusually compact.

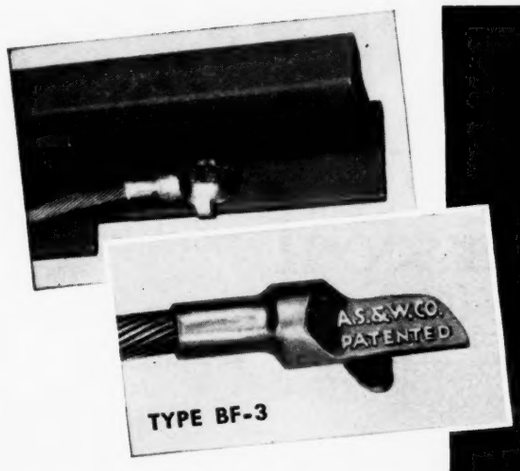
McNALLY PITTSBURG MFG. CORP.

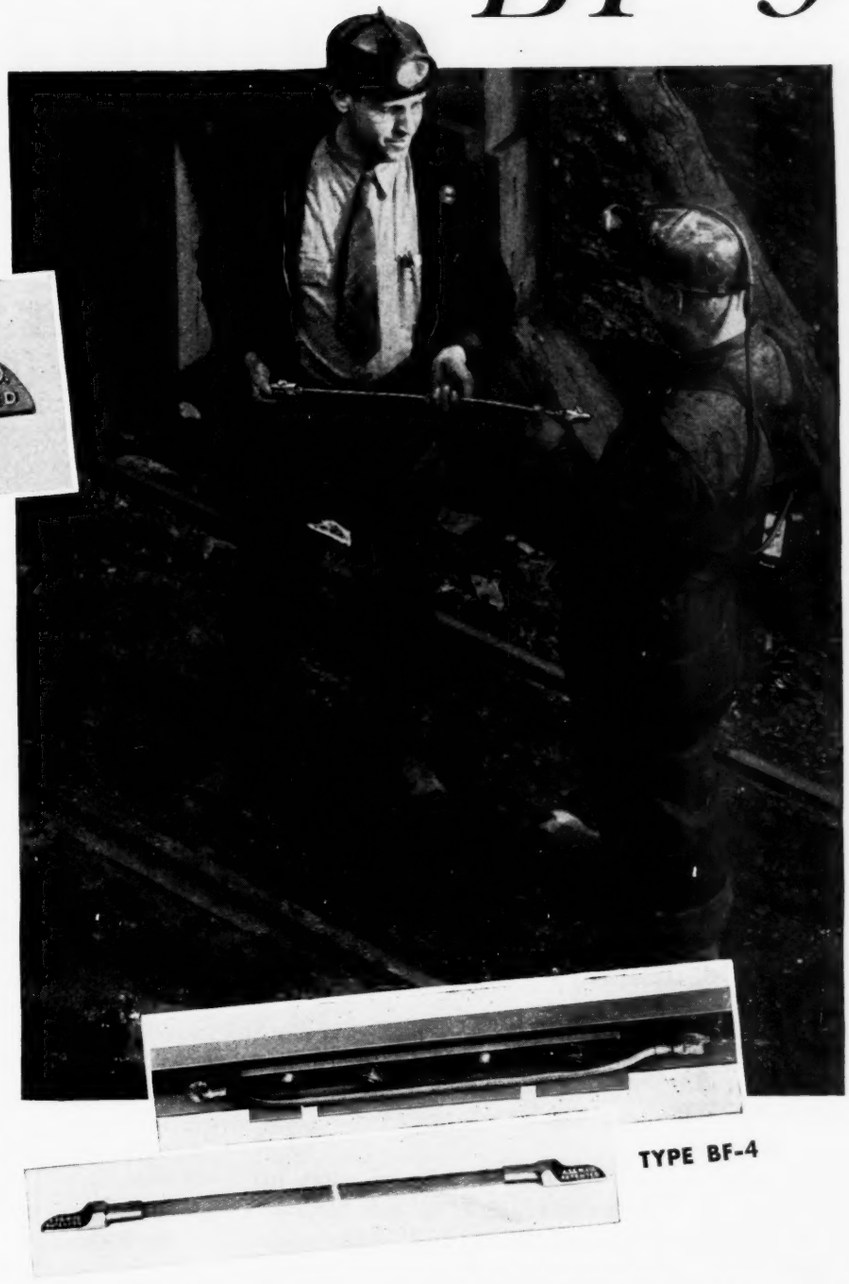
Main Office and Works
Pittsburg, Kansas

General Sales Office
307 N. Michigan Ave., Chicago

Eastern Office
Koppers Bldg., Pittsburgh, Pa.

MINERS AGREE ON THE *BF-3*





Here's a power bond that cuts welding time and gives long-lasting trouble-free service

THE TIGERWELD BF-3 was designed to simplify in every possible way the job of welding it to the rail—and at the same time provide an effective and lasting bond, good for long-time service.

This bond's terminal is formed into a sloping surface, at just the right angle for easy welding. No clamps are required to hold it in place. Just tap the terminal on the rail base with a hammer, and there it stays—held by self-clamping hooks on the terminals—until the weld is finished. If you aren't already using this bond, it will pay you to give it a try.

A modification of the Tigerweld BF-3 Power Bond, used where greater protection against mechanical damage is desired, is the TIGERWELD BF-4 Power Bond. The two are identical in every respect, except that the BF-4 has no self-clamping hooks on the terminals. It can therefore be pushed back against the rail web, and welded in place under the protecting shield of the rail head. In this position the terminal forms a pocket with the rail for depositing the welding metal. Both of these bonds are of typical Tigerweld construction, with solid steel terminals flash butt-welded to the conductors—made to give long, efficient service.

AMERICAN STEEL & WIRE COMPANY

Cleveland, Chicago and New York

For Anthracite Service: Miners Bank Building, Wilkes-Barre, Pa.

Columbia Steel Company, San Francisco, *Pacific Coast Distributors* United States Steel Export Company, New York

UNITED STATES STEEL

CUSHIONING

done properly can better your coal

"Pulling the punch" of an explosive may sound wasteful.

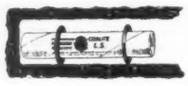
But cushioning, where permissible, can give you better coal—and more of it.

When you use cushioning, use sufficient stemming. Tamping should be done so as to provide ample and positive confinement.

Four Modern Methods of Cushioning

Cartridges of smaller diameter than the drill hole. Air space around the explosive cartridge cushions the blast. In addition, the explosive detonates at lower velocity than would be the case were the same explosive detonated in a close, tight hole.

Tamping. Cushioning is produced by simply pushing back the first dummy, lightly tamping the second. The third and fourth dummies are then tamped tight.



Mechanical Means. Devices, such as fibre rings, which support the cartridge and keep the explosive from direct contact with the coal—thus cushioning the shot.

Sheathing. Light, bulky, inert materials used in sheaths provide a certain amount of cushioning. Sheathing also adds to safety by reducing both temperature and flame.

Atlas Technical Representatives are familiar with the "pros and cons" of various methods of cushioning. Their experience is at your disposal.

ATLAS TECHNICAL SERVICE can help on your blasting problems

No. 9 of a Series

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY WILMINGTON, DELAWARE

ATLAS EXPLOSIVES

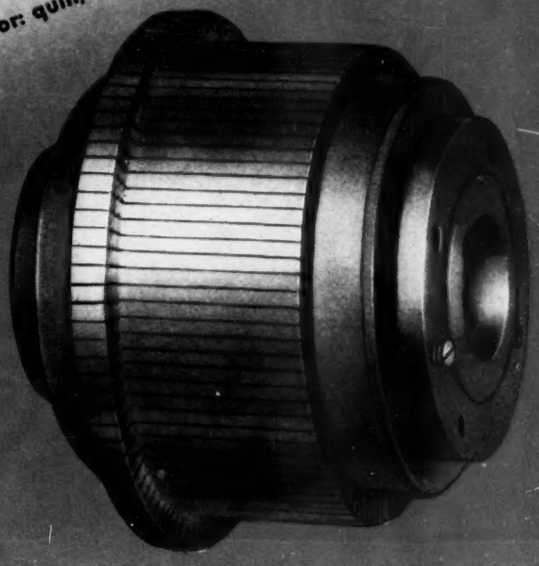
Offices in Principal Cities

"Everything for Blasting"

Typical COMMUTATOR of the NEW G-E D-C MOTOR

WE ASSEMBLE IT WITH 12 TONS PRESSURE

Assembly parts of the new G-E direct-current motor commutator: quill, steel caps, mica cones, hardened-copper and mica segments, and retaining lock nut



BUT YOU CAN TAKE IT APART —AND PUT IT TOGETHER— WITH A HAND WRENCH

YOU get good commutation in a G-E direct-current motor because the great pressure and high temperature applied in assembling the commutator—plus careful machining — assure rigidity, uniformity, and precise alignment of every part. Yet, in an emergency, the entire commutator can be conveniently disassembled after removing a steel lock nut and set screw. Reassembling on the job requires no press.

You'll find other new features in this commutator: mica segments on the open end extend beyond the copper segments to give increased creepage paths; a tumbling process completely eliminates burrs from the hard-drawn copper segments; and the end of the assembly has a smooth, arc-resistant surface of Glyptal No. 1201 Red.

But features of the General Electric d-c motor are by no means limited to the commutator. Get the facts on the tough armature; sturdy, adjustable brush rigging; Form-ex wire field coils; and improved bearings. Call or write your local G-E office for details that show why you can expect economical, dependable service from this motor. General Electric, Schenectady, N. Y.

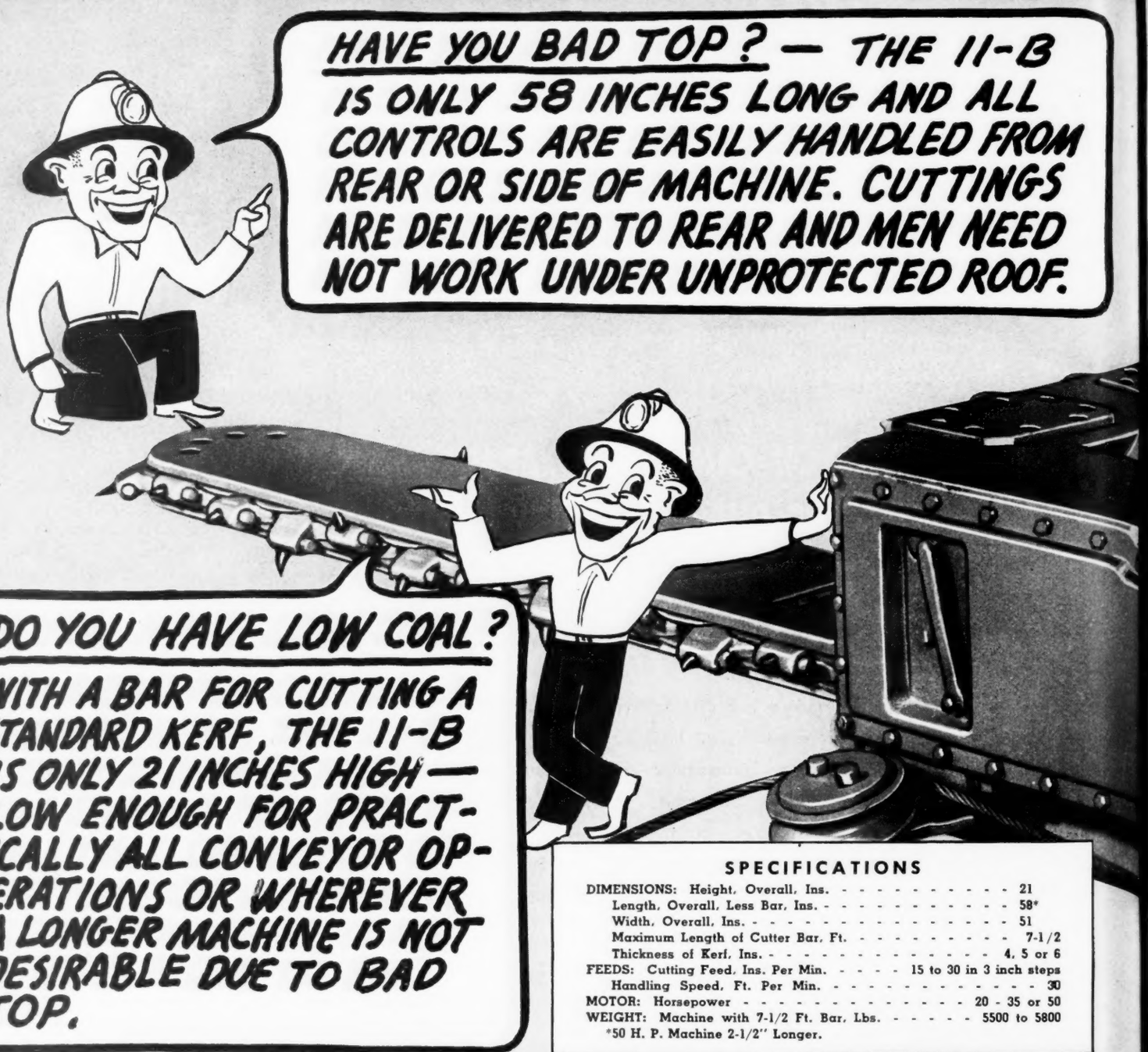
General Electric d-c motor, Type B, typical of the smaller ratings

GENERAL ELECTRIC

250-68-8 MM

The SULLIVAN 11

"The Lowest Cutter in Its Power Range Wh


HAVE YOU BAD TOP? — THE 11-B IS ONLY 58 INCHES LONG AND ALL CONTROLS ARE EASILY HANDLED FROM REAR OR SIDE OF MACHINE. CUTTINGS ARE DELIVERED TO REAR AND MEN NEED NOT WORK UNDER UNPROTECTED ROOF.
DO YOU HAVE LOW COAL?
WITH A BAR FOR CUTTING A STANDARD KERF, THE 11-B IS ONLY 21 INCHES HIGH — LOW ENOUGH FOR PRACTICALLY ALL CONVEYOR OPERATIONS OR WHEREVER A LONGER MACHINE IS NOT DESIRABLE DUE TO BAD TOP.

SPECIFICATIONS

DIMENSIONS: Height, Overall, Ins.	21
Length, Overall, Less Bar, Ins.	58*
Width, Overall, Ins.	51
Maximum Length of Cutter Bar, Ft.	7-1/2
Thickness of Kerf, Ins.	4, 5 or 6
FEEDS: Cutting Feed, Ins. Per Min.	15 to 30 in 3 inch steps
Handling Speed, Ft. Per Min.	30
MOTOR: Horsepower	20 - 35 or 50
WEIGHT: Machine with 7-1/2 Ft. Bar, Lbs.	5500 to 5800

*50 H. P. Machine 2-1/2" Longer.

SULLIVAN MACHINERY COMPANY

EXECUTIVE OFFICES: MICHIGAN CITY, INDIANA

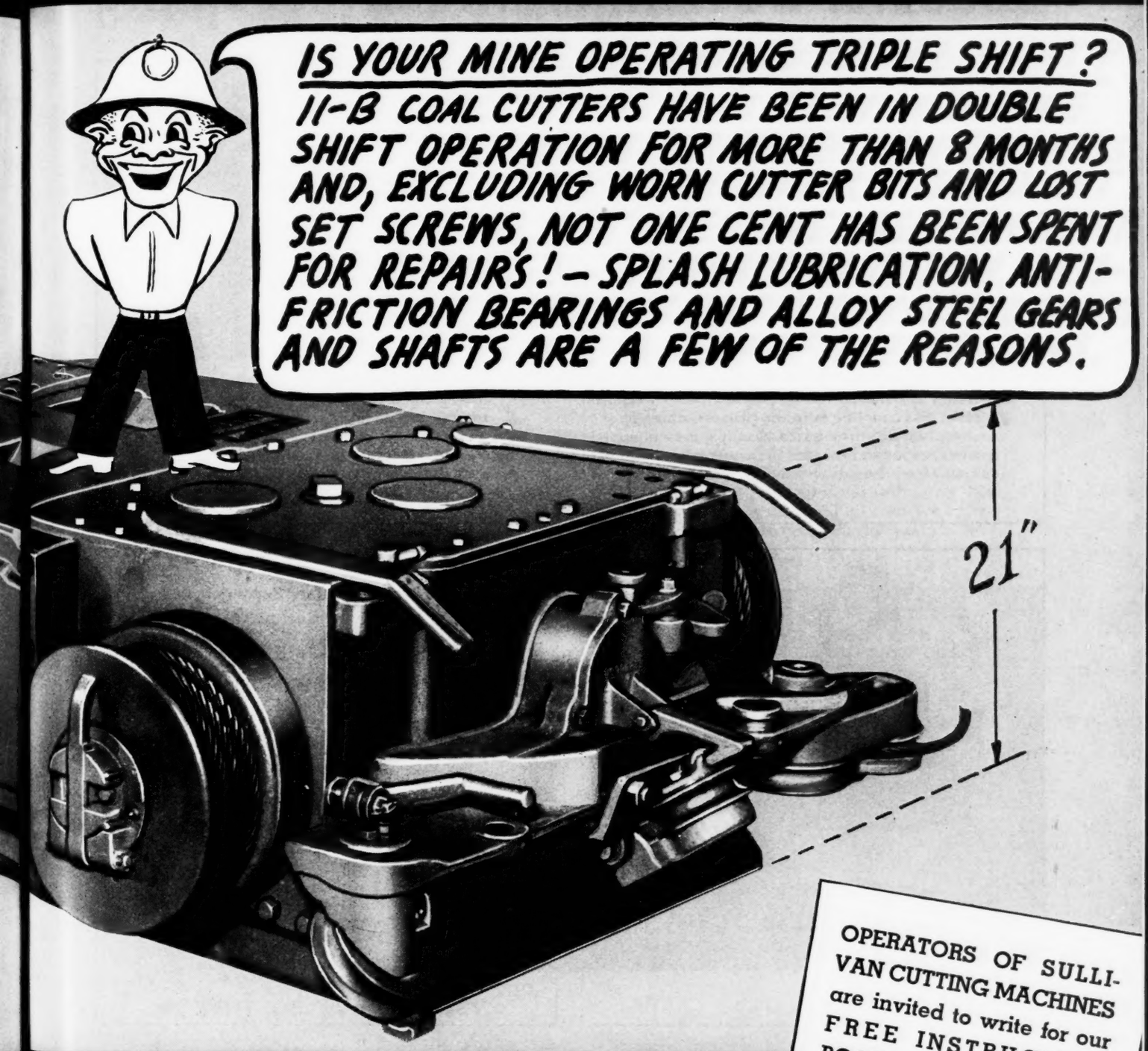
FACTORIES: MICHIGAN CITY, IND.; CLAREMONT, N. H.; DUNDAS, ONTARIO; GRANTHAM, ENGLAND

Associated House: CANADIAN SULLIVAN MACHINERY CO. LTD., DUNDAS, ONTARIO

"SPECIALISTS IN COAL CUTTERS"

11-B SHORTWALL

e Which Discharges Cuttings at the Rear"


IS YOUR MINE OPERATING TRIPLE SHIFT?
11-B COAL CUTTERS HAVE BEEN IN DOUBLE SHIFT OPERATION FOR MORE THAN 8 MONTHS AND, EXCLUDING WORN CUTTER BITS AND LOST SET SCREWS, NOT ONE CENT HAS BEEN SPENT FOR REPAIRS! – SPLASH LUBRICATION, ANTI-FRICTION BEARINGS AND ALLOY STEEL GEARS AND SHAFTS ARE A FEW OF THE REASONS.
21"

OPERATORS OF SULLIVAN CUTTING MACHINES are invited to write for our FREE INSTRUCTION BOOKS. Instructively written and well-illustrated, these books simplify the training of new men and help the experienced man to maintain his machine.

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Pittsburgh, Pa. - - - 47 Terminal Way, So. Side
Portland, Ore. - - - - 1631 N. W. Thurman St.
Salt Lake City, Utah - 117 W. Second South St.
Scranton, Pa. - - - - - - - - 809 Linden St.
St. Louis, Mo. - - - - - - - - 2639 Locust St.
Seattle, Wash. - - - - - - 3410 First Ave. So.
Antofagasta, Chile - - - - - - - - Casilla 570
Brussels, Belgium - - 15 Rue du Grand Hospice
Calcutta, India - - - - - - - - 18 Tangra Road
Christchurch, New Zealand - 134 Oxford Terrace
Johannesburg, Transvaal - - - - 21 Sauer St.
Grantham, Lincs., England - - - Grange Works
N'Dola, Northern Rhodesia
Oslo, Norway - - - - - - - - Tolbodgaten 8-B
Paris, France - - - - - - 18 Avenue Parmentier
Santiago, Chile - - - - - - - - - Casilla 86-D
Sao Paulo, Brazil - - Praca Ramos Azevedo 16
Sydney, Australia - - - Chatsworth House, 1-7 Brent St.
Turin, (103) Italy - - - - - Via Perrone, No. 4

It's a Cinch to Use This Safer, Speedier Du Pont "Ventube"* Coupling

1 About as quick as you can say *Du Pont "Ventube,"* this coupling falls into place. Nothing to fasten on. Nothing to misplace. No clips, no clamps. No metal exposed, no spare parts to bother with. It's a *one-piece* job that's sewed right into the tubing.

2 Yes sir, and it's safer, too! You can get air-tight joints in a jiffy, without a thought of leaky connections due to lost or bent parts. And the way this coupling is constructed permits it to contract and expand, insuring foolproof joints.

3 It's made of heavy copper plated steel that resists rust. Has a rolled flange that prevents tearing when rings are coupled. It won't bend or crush out of shape from rough handling. And since all rings are the same size, they can easily be reversed if necessary.

Mining Men and Safety Engineers who have used this sewed-in coupling—or seen it demonstrated—agree it's the easiest-to-use coupling on the market—*and the safest!* Already it's being widely used in leading mines.

May we suggest—if you aren't already familiar with the many advantages of Ventube—ask a Du Pont representative to call at your mine. We're at your service!

• . • •

NEED POWDER BAGS? Remember, DuPont makes a complete line of powder bags from the same sturdy material used in making flexible "Ventube" rubberized ventilating duct. Powder bags are available in several convenient sizes. Write for prices and complete information.

**"Ventube" is Du Pont's registered trademark for its flexible rubberized ventilating duct*

DU PONT
REG U.S. PAT OFF
VENTUBE
REG U.S. PAT OFF

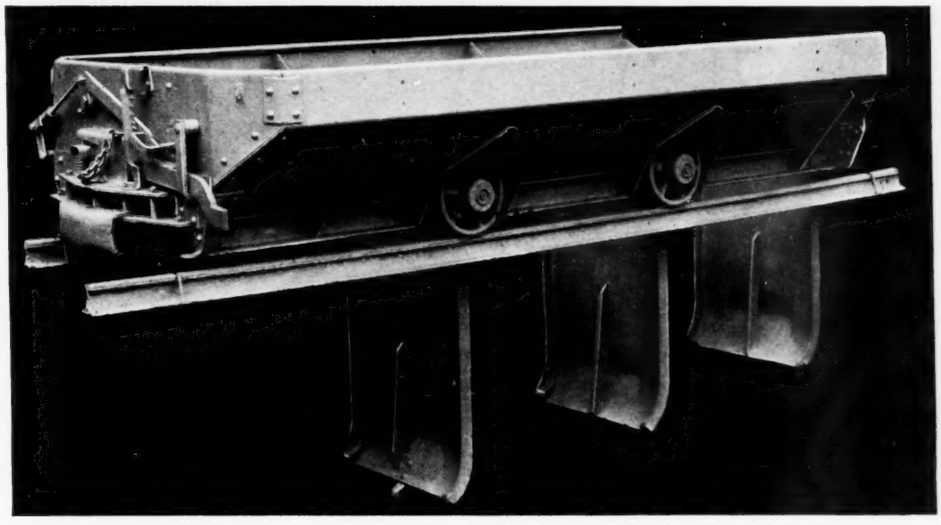
E. I. DU PONT DE NEMOURS & CO. (INC.)
"FABRIKOID" DIVISION, FAIRFIELD, CONNECTICUT
Hartley Building, Duluth, Minn.—Midland Savings Bank Building, Denver, Colo.

THE FLEXIBLE VENTILATING DUCT

"IF I HAD KNOWN THEN WHAT I KNOW NOW—"

● After installing S-D "Automatics," dozens of operators doubtless regret that they waited so long to investigate the tremendous savings of these wonderful mine cars. They now realize that they would have made thousands of dollars in extra profit had they started earlier. How about you?

Last month we gave details of what one coal company is saving. Read this ad again. Tipple labor has been reduced 55%; one locomotive out of three has been eliminated, while coal output was increased 28%; extra efficiency of haulage increased 92%; time of cars at tipple for dumping coal and slate was reduced 96%. 30 S-D "Automatics" replaced 120 old cars, resulting in reduction of maintenance cost on cars of 90%. Does this sound too good to be true? It is true. Read our last months ad again. Our files are full of records from coal operators who have thrown away old fashioned cars and put in S-D "Automatics." These records are yours for the asking. What are you in business for? Doubtless to make money—pay big dividends on your stock. The best way that we know of to do this is to install S-D "Automatics."



WE RENT S-D "AUTOMATICS"

● You may be amazed, but we are renting S-D "Automatics" on a basis where the average rental cost over a 15 year period is less than 2c per ton on the coal transferred in the car. Free maintenance parts for car bodies are supplied under contract for several years period. For the same period, grease is supplied free where S-D "Floater" Ball Bearing Wheels are used. Ball bearings and wheel castings have separate guarantees for five years use. These items will doubtless save you more than the average rental cost. So, you practically get the use of the cars free with no cash investment outlay.

SANFORD-DAY IRON WORKS, KNOXVILLE, TENN.

Mine Cars, all types—Trailers—Sheaves—Wheels

for MAXIMUM CAPACITY IN MINIMUM SPACE

Interchangeable

WITH SINGLE-ROW BALL BEARINGS

NORMA-HOFFMANN

PRECISION ROLLER BEARINGS

NORMA-HOFFMANN BEARINGS CORP'N.,

STAMFORD, CONN., U. S. A. • *Founded in 1911.*

Write for the Catalog. Let our engineers work with you.

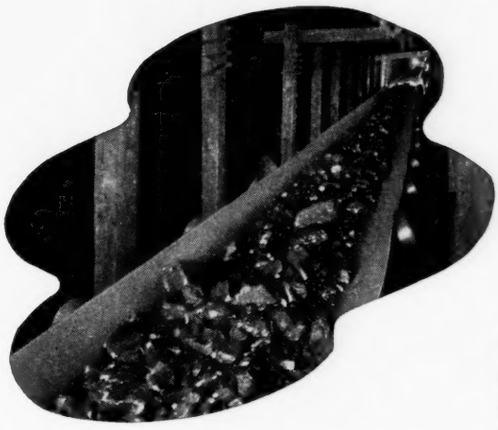
Their solid cylindrical rollers provide maximum contact area, giving larger load and shock-absorbing capacity than any other single-row bearing of like dimensions. Thus, when NORMA-HOFFMANN PRECISION ROLLER BEARINGS are used in place of ball bearings, a greater factor of safety is provided, together with added life, particularly under vibration and overload. PRECISION qualities in workmanship and materials adapt them alike for both low and high speeds.

THE ONLY

Mildew-Protection

WORTH ANYTHING IS PROTECTION

AGAINST *ALL* KINDS!



IT is now generally recognized throughout the coal mining industry that mildew is one of the principal causes of premature conveyor belt failure in underground service.

This conviction results from the fact that in the same mines, under identical conditions, Goodyear *mildew-inhibited* belts often give from TWO to FIVE times longer service than unprotected belts.

The reason why Goodyear belts stand up so much longer where damp-rot is prevalent is that they are inhibited against ALL types of mildew – *and there are more than 500 different types!*

We know from our long experience that compounding agents which totally check one type of mildew may have absolutely no effect on others.

We learned this by exposing variously-treated carcass fabrics to mildew attack in scores of mines – by testing others with mildew cultures in our laboratories. Only by a tedious process of trial and error did we finally perfect a master-inhibitor that definitely checks all forms of mildew.

Because moisture conditions vary in all mines, it is impossible to know which of the many types of mildew you need protection against. Therefore, the only mildew protection worth anything is *protection against all kinds!*

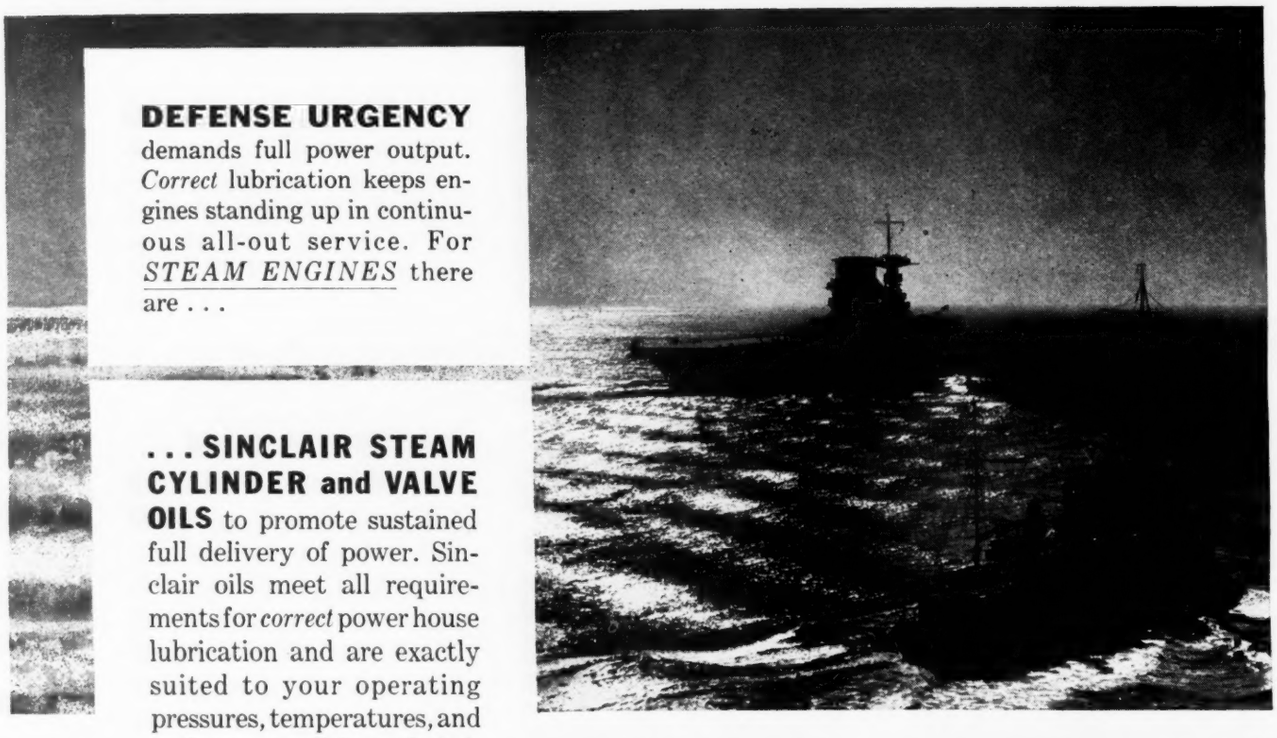
Remember that when you buy conveyor belts. The G. T. M. – Goodyear Technical Man – will be glad to show you case history records of Goodyear's long fight against mildew and the remarkable increase in belt-life resultant. To consult him, write Goodyear, Akron, Ohio or Los Angeles, California – or phone the nearest Goodyear Mechanical Rubber Goods Distributor.

Goodyear mildew-inhibited conveyor belts hold world tonnage records for hauling both anthracite and bituminous coal

THE GREATEST NAME IN RUBBER

GOODYEAR

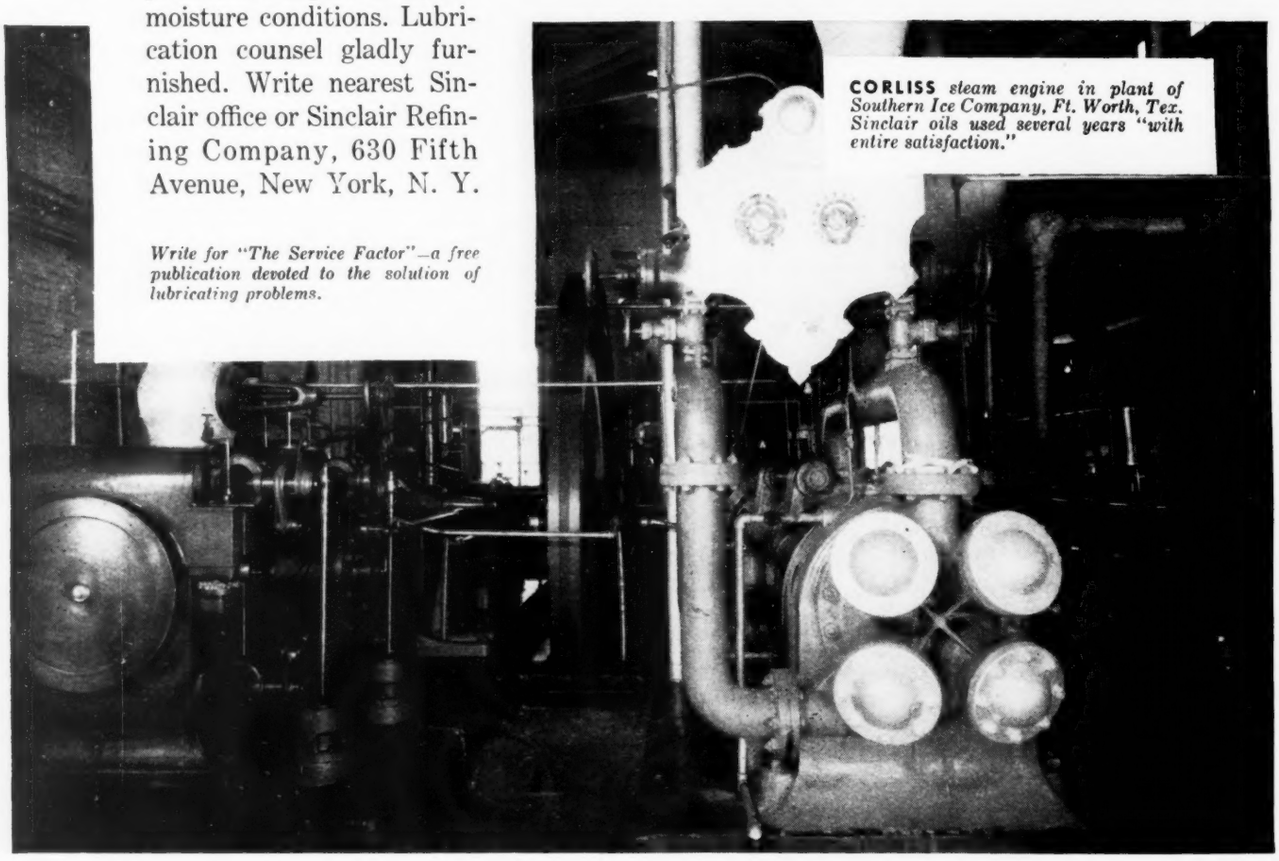
MORE TONS ARE HAULED ON GOODYEAR CONVEYOR BELTS THAN ON ANY OTHER KIND



DEFENSE URGENCY demands full power output. *Correct* lubrication keeps engines standing up in continuous all-out service. For *STEAM ENGINES* there are . . .

. . . SINCLAIR STEAM CYLINDER and VALVE OILS to promote sustained full delivery of power. Sinclair oils meet all requirements for *correct* power house lubrication and are exactly suited to your operating pressures, temperatures, and moisture conditions. Lubrication counsel gladly furnished. Write nearest Sinclair office or Sinclair Refining Company, 630 Fifth Avenue, New York, N. Y.

Write for "The Service Factor"—a free publication devoted to the solution of lubricating problems.



CORLISS *steam engine in plant of Southern Ice Company, Ft. Worth, Tex. Sinclair oils used several years "with entire satisfaction."*

SINCLAIR INDUSTRIAL OILS

SINCLAIR REFINING COMPANY (Inc.)

254C West Cermak Road, Chicago • 10 West 51st Street, New York City • 1907 Grand Avenue, Kansas City • 573 West Peachtree Street, Atlanta • Fair Building, Ft. Worth

STRONG AS A GORILLA . . .

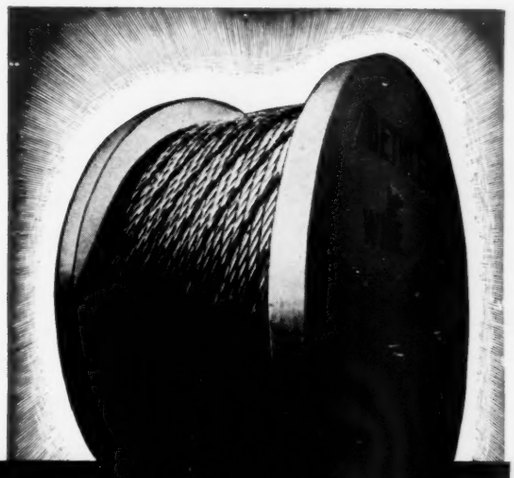
supple as a greyhound

Next time you buy wire rope for a hard-running job—get Bethlehem Purple Strand Form-Set.

Purple Strand means that the rope is 100 per cent Improved Plow Steel—the strongest, toughest steel used in the commercial wire rope business. Form-Set means that the rope is preformed—that it's easy to handle, won't wicker, spools smoothly and is more resistant to bending fatigue.

If you want the utmost in both flexibility and ruggedness, Purple Strand Form-Set is your rope.

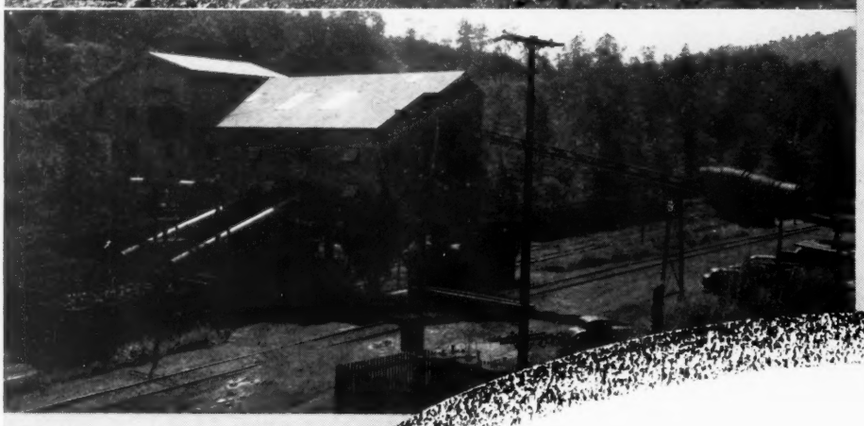
PURPLE STRAND
FORM-SET
WIRE ROPE



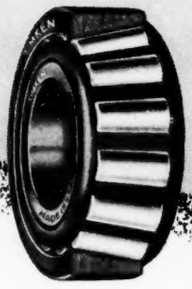
BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

BIG S-D Drop-Bottom Cars At Marianna



ROLL ON TIMKEN BEARINGS

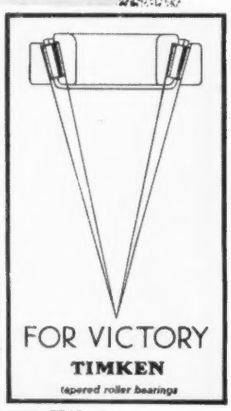


The first of two new mines opened by Pond Creek Pocahontas Company in the rich Wyoming County, W. Va., smokeless coal field has been mechanized and now is in regular production.

Some of the largest drop-bottom cars used in any mine are in operation here. They have a capacity of more than 10 tons each and were built by Sanford-Day Iron Works. These cars haul the coal from the mine to a dump, from which it is carried up to the tipple by a belt conveyor operating on Timken Bearing Equipped idlers.

Photograph No. 1 shows a trip of the big drop-bottom cars being pulled through the dump. Photograph No. 2 shows the belt conveyor which carries the coal from the dump to the tipple.

These cars will be helping to get out coal at a profit long after the present defense emergency has become a memory.

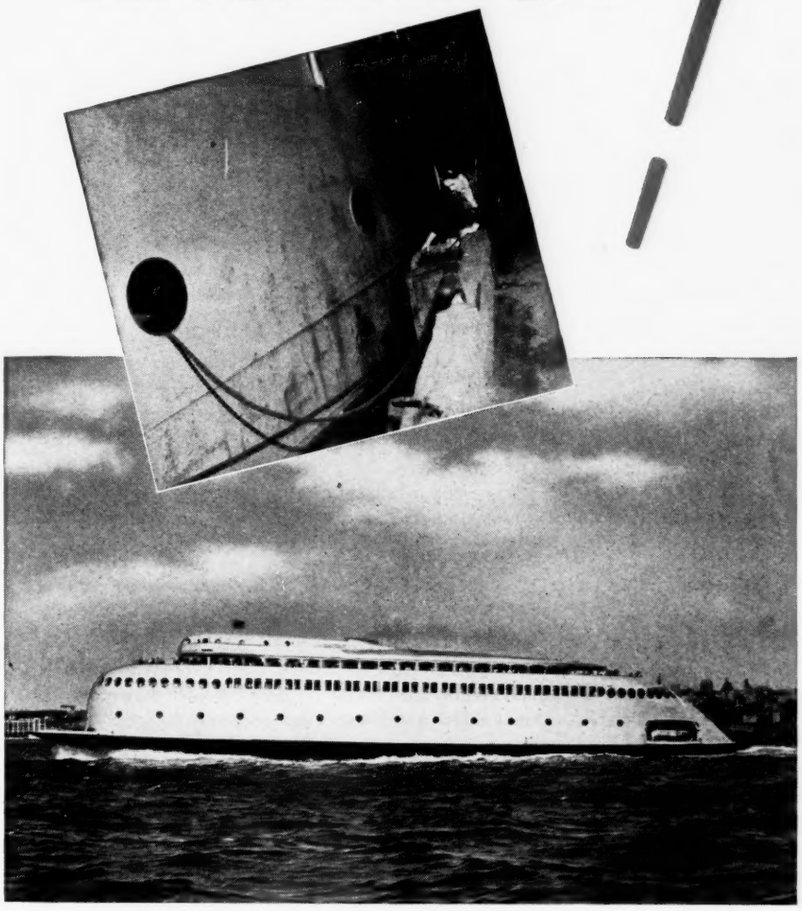


THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

Manufacturers of Timken Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; Timken Alloy Steels and Carbon and Alloy Seamless Tubing; and Timken Rock Bits.

TIREX TAKES OVER THE LOAD ON THE 'KALAKALA'!



The streamlined ferry Kalakala has a speed of 17½ knots. She carries passengers as well as automobiles to cities on Puget Sound.

When the famous streamlined ferry Kalakala, "flying bird" ties up for the night the Puget Sound Navigation Company, her owners, have found that it is cheaper to use power from the outside than it is to keep the ferry's generators running. To make the connection between the ferry and the source of power they use a 3-conductor, #2 TIREX selenium rubber armored portable cable.

The present TIREX cable on this ferry has been in service for five years and it is still in good condition. On another one of their ferries they have a 3-conductor, #2 TIREX cable which has been in service for seven years and it is also in good condition. This is another instance of the unusual uses to which TIREX cables are put.

When you want a cable to do dependable work get a TIREX cable. The next time you need a portable cable specify TIREX.

Simplex Wire & Cable Co., 79 Sidney Street, Cambridge, Mass.

SIMPLEX WIRES CABLES

Big gulps of overburden with big Bethlehem Ropes

Profitable strip mining depends largely on the economical removal of the overburden. For this purpose many large mid-western operators are using gigantic shovels with bites up to 32 cu. yds. as well as draglines with 200-foot booms. And keeping these costly machines in continuous operation is a job that calls for big, tough wire rope. Bethlehem Purple Strand is often used because it meets every requirement for this gruelling work.

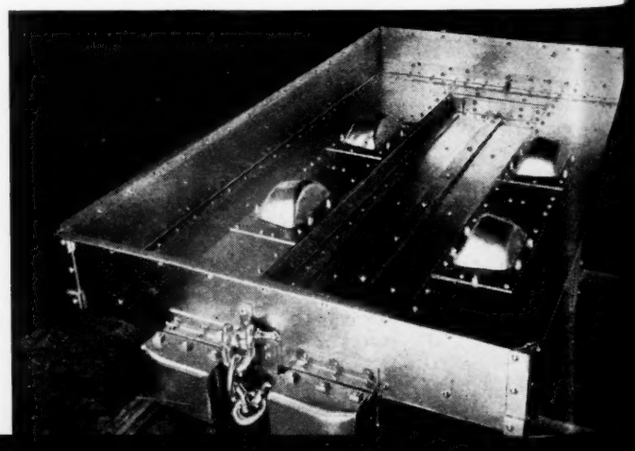
Purple Strand is made of improved plow steel, the toughest, strongest steel used in wire rope manufacture. It is a 100 per cent Bethlehem product from the blast furnace to the closing machine—and every step along the way is checked by competent metallurgists. This rope is made in the usual constructions and in diameters ranging up to more than 3 inches.

Better designed—better built Bethlehem Mine Cars

Bethlehem's engineers design mine cars with two factors in mind: high capacity for over-all dimensions and low ratio of dead load to useful load. These factors are applied to individual mine requirements so that the finished cars will operate at maximum efficiency always.

All designs are carrried out in Bethlehem's up-to-date car shops. Every part used is made in dies and jigs to insure accuracy and interchangeability. Here two major assembly lines are coordinated: one for wheels, axles and bearings and another for bottoms, sides and ends.

These modern methods have saved in car building costs and have brought about uniformity of quality in the finished product, making Bethlehem Mine Cars ideal for quantity use in modern, mechanized operations.



roofing against Rust-sabotage

WITH BETH-CU-LOY COPPER-BEARING STEEL SHEETS

Now with coal production being stepped up for the emergency, new breakers and hoists are being installed and old tipples and conveyors are being reconditioned. Here, siding and roofing need the defense afforded by rust-resisting Beth-Cu-Loy galvanized steel sheets.

Here's how these Beth-Cu-Loy siding and roofing sheets battle corrosion. First, they have a tight coating of brightly-spangled pure zinc. Next, the steel itself has a copper content of .20 to .30 per cent. Steel of this composition is good for twice the life of ordinary steel. Tests by the A.S.T.M. have proved this in various localities.

The added cost of a Beth-Cu-Loy sheet is only a few cents—this slight increase buys a gain in value of years of added service. Use Beth-Cu-Loy around your mines. It will pay in longer life and less time out for housing repairs.

Bolts, nuts, spikes, rivets for faster fastening

Today, trackmen don't have time to work with balky bolts and nuts. Every twist must count—every nut must be perfect. Adequate wrench pressure can be put on Bethlehem mine-track bolts and hot-forged nuts without danger of stripping threads. They draw up tight without failure, because they're made up in the correct sizes for every track weight from 12 lbs. to 60 lbs. Any Bethlehem bolt can be easily identified by the "A" on its head.

Bethlehem track spikes drive easily due to their clean cut points and full heads. They are made from new-billet steel exclusively.

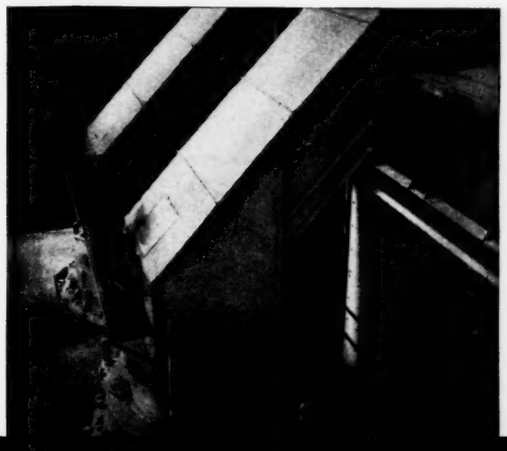
Bethlehem rivets are available in all sizes and all head designs for mine repair and maintenance work.

Bins, hoppers, chutes that stand the gaff

The slam-bang action of cascading coal calls for a tougher-than-ordinary steel in bins, chutes and like equipment. That's why Bethlehem Abrasive-resisting Steel Plate is being used today to conserve steel and to lower production costs.

When used in the same equipment, under the same conditions, Bethlehem Abrasive-resisting Steel outlasts mild carbon steel two to ten times.

Bethlehem Abrasive-resisting Steel is a low-priced, carbon, manganese, silicon combination with a high percentage of hardening and toughening elements. It has an approximate Brinell of 235. It is tough in the as-rolled condition and requires no extra treatment to bring out its abrasive-resisting qualities.



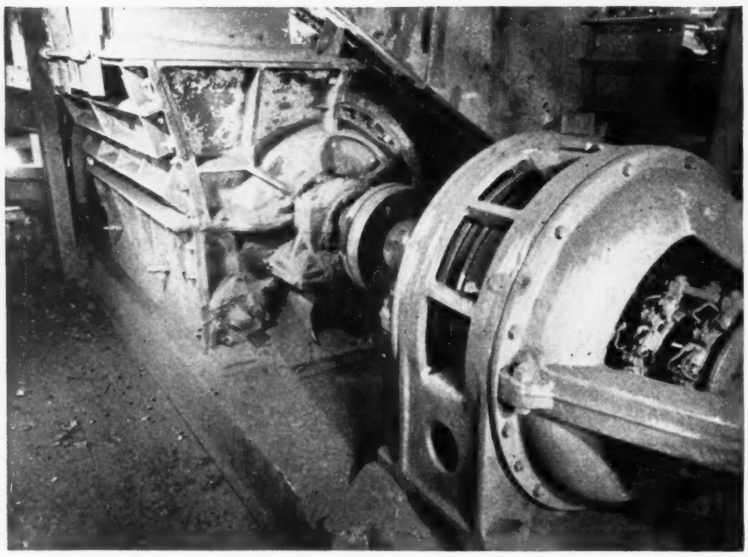
BETHLEHEM STEEL

2,573,836 Tons CRUSHED

Without One Cent MAINTENANCE COSTS . . .

AN UNUSUAL CASE? . . Sure!

BUT 13 years of dependable operation with such economy shows the sturdy, reliable qualities of the American Ring Crusher . . . .



Size 60S rated to crush 300 tons per hour of 6-inch lump down to ¾-inch.

The crusher pictured was purchased by the Wheeling Township Coal Mining Company and installed March 1, 1928. It was guaranteed to crush 429,000 tons without any maintenance expense.

Up to June 1941—a total of 13 years, 2 months and 17 days from date of installation—this crusher has operated without one penny being spent on it for maintenance.

Of course, this is unusual, but it is used to illustrate the remarkable ability of the American Ring Coal Crusher to operate economically and stay on the job. It demonstrates the kind of performance that has earned a leader's reputation.

It actually costs less than one cent a ton, including all costs, to reduce bituminous coal from lump to stoker size. We will be glad to thoroughly survey your requirements and recommend only such equipment needed for your specific purposes. Each crusher guaranteed for the job.

Coal is split instead of crushed

REVERSIBLE MANGANESE STEEL SHREDDER RINGS reduce fines to a minimum

This patented feature is found only in the American Rolling Ring Crusher. It splits the coal instead of crushing it, thereby assuring a uniform size of crushed coal. An adjustable grinding plate makes it possible to secure properly sized coal for either stoker or pulverized coal burning. The crusher can be adjusted to make either a maximum or minimum amount of fines.

AMERICAN PULVERIZER COMPANY 1119 MACKLIND AVENUE ST. LOUIS, MISSOURI

ORIGINATORS AND MANUFACTURERS OF RING CRUSHERS AND PULVERIZERS

WICKWIRE ROPE

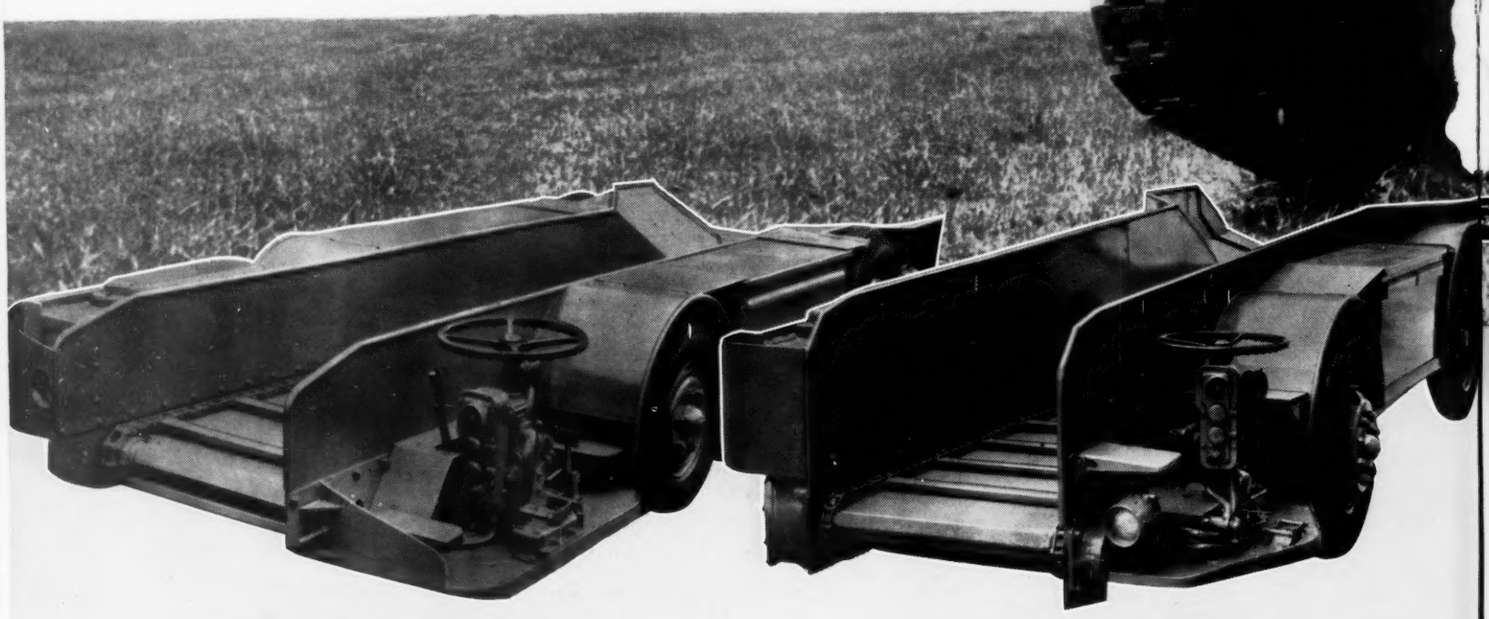
Use, not time, destroys wire rope. The oil man must think in terms of foot-hole-drilled, the building manager elevator car-miles-traveled, the logger the per-thousand-feet of lumber, the mine and sand or gravel operator per-ton or per-yard of material moved. The unit-of-use cost method is the only sound way of evaluating wire rope. It's the method we want you to use when passing judgment on Wickwire Rope. Our bid for your future business is the lower per-unit-of-use cost that you will get from Wickwire Rope.

WICKWIRE SPENCER STEEL COMPANY

General Offices: 500 Fifth Avenue, New York City; Sales Offices and Warehouses: Worcester, New York, Chicago, Buffalo, San Francisco, Los Angeles, Tulsa, Chattanooga, Houston, Abilene, Texas, Seattle. Export Sales Department: New York City

Mechanizatio
is vital!

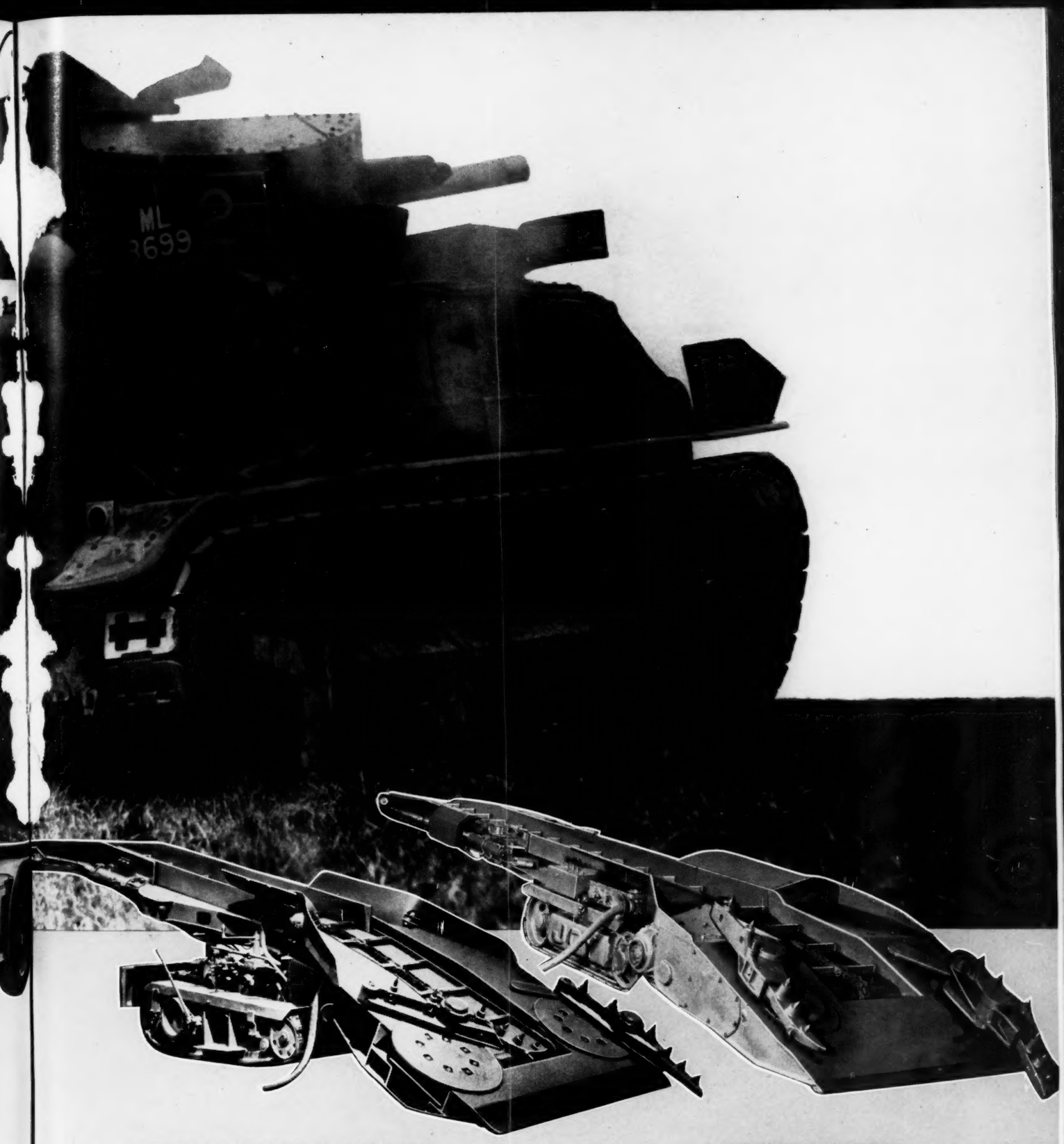
Just as Mechanization is necessary and vital to the success of our military forces . . . so is it necessary and tremendously important to the coal mining industry.



LOW SEAM SHUTTLE CAR
JOY 32" SHUTTLE CAR—3½ ton capacity for low seam operations.

6-TON CAPACITY SHUTTLE CAR
JOY 42" SHUTTLE CAR—6 ton capacity for high seams.

Less cost...Greater Tonnage with JOY EQUIPMENT

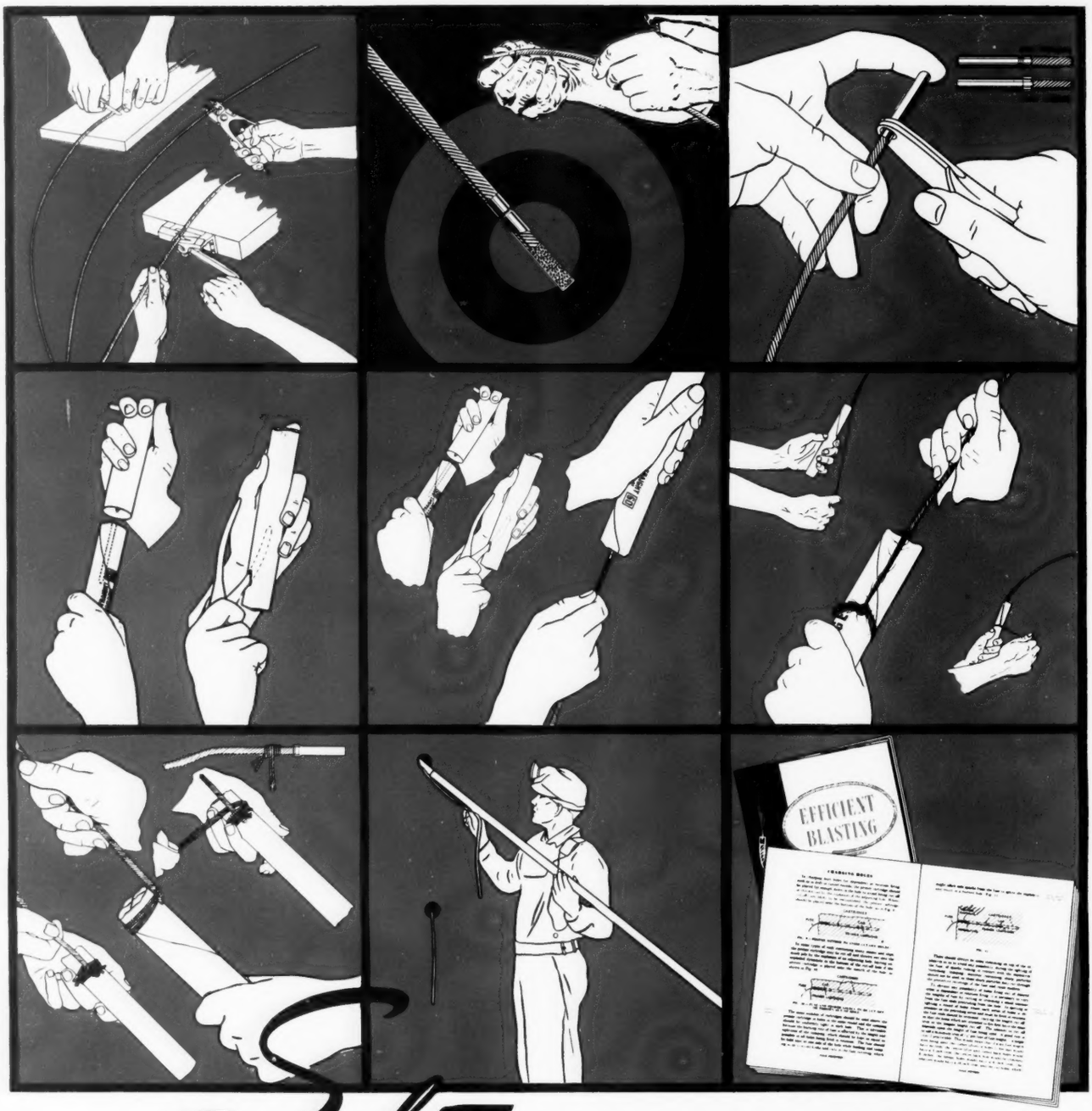


HEAVY DUTY HIGH CAPACITY
JOY 11-BU LOADER—a heavy duty machine of high capacity, 8-10 tons per minute.

LOW VEIN MACHINE
JOY 14-BU LOADER—a high capacity low vein machine . . . only 26" high . . . 5 tons per minute.

JOY

MANUFACTURING CO.,
FRANKLIN, PA.



Safety···MADE SIMPLE

ENSIGN-BICKFORD SAFETY FUSE

These nine simple diagrams show the approved methods of preparing a primer cartridge. The drawings themselves tell the whole story clearly and simply. The series stresses safety without preaching. They might do a valuable job for you on your bulletin board. If you would like to receive one or more sets, please write us.

THE ENSIGN-BICKFORD COMPANY, SIMSBURY, CONN.

SF-119

Manufacturers of Safety Fuse since 1836—also Primacord-Bickford Detonating Fuse

DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

Coal Age

Established 1911 — McGraw-Hill Publishing Co., Inc.
SYDNEY A. HALE, Editor • DECEMBER 1941

Pertinent and Impertinent

• "THE UNITED STATES does not consider it a sacrifice to do all one can, to give one's best, to our nation when the nation is fighting for its existence and its future life. It is not a sacrifice for any man, young or old, to be in the Army or Navy of the United States. It is not a sacrifice for the industrialist or the wage earner, the farmer or the shopkeeper, the trainman or the doctor, to pay more taxes, to buy more bonds, to forego extra profits, to work longer or harder at the task for which he is best fitted. Rather, it is a privilege," declared our President in his address to the nation Dec. 9. Our duty is clear: "to give one's best"; and that includes buying Defense Bonds and Stamps to the limit of our ability.

• COAL production in 1942 (anthracite and bituminous combined) bids fair to exceed the 1941 figure by at least 50,000,000 tons. It may be much more, as the need for production of vital war materials is sharply increased. If injuries are not to go up accordingly, now is a good time to look to safety. No "blue sky" promoter ever had a better proposal to offer than coal-mine safety. It pays off in decreased suffering and hardship, lower costs, decreased damage to property and equipment, fewer interruptions of production, and higher efficiency. All take on added importance now that the country must exert every effort to preserve its free and democratic way of life. What better way to start the new year than by planning to include in the list of important things to do the elimination of the word "accident" from the coal-mining vocabulary.

• CLASS I railroads put 64,680 new freight cars in service in the first ten months of 1941, of which 26,312 were coal cars. New cars on order on Nov. 1 totalled 80,504, compared with 27,459 on Nov. 1, 1940. Coal cars on order on Nov. 1 this year aggregated 22,169. While these will help prevent a possible shortage now and in the future, better loading is an even surer method of guarding against such a shortage. In the words of L. W. Baldwin, Missouri Pacific Lines: "Approximately 149,500 freight cars are being loaded daily. Loading merely 1 ton more per car has the same effect as the purchase of 58,000 cars. One additional mile per car per day obtained by everyone handling cars promptly would result in increasing the available supply by more than 40,000 cars. Is it not food for thought that transportation facilities can be so easily enlarged?"

• HOW CLOSE can the average mine come to the goal of operating without fatalities? Pretty close, if the records of some operations are any criterion. Thirteen years was the latest achievement at No. 1 mine, Gay Coal & Coke Co., Mount Gay, W. Va. Sympathy for management and men over the break in their record on Nov. 29 is mingled with admiration for their good work over this long period of time. That they will recover and go on to new heights is augured by the fact that this is not the first long-time fatality-free period in the history of the Gay organization, which began mining in 1904. It was not until well over 20 years later that it had its first death.

Americans First

YESTERDAY, coal mining, in common with other civilized industrial enterprises, faced business and social problems which seemed vitally important. Tomorrow—but with a new objective—we shall grapple with conflicting interests and desires again. Today, individual aspirations which divided us are fused in the flames of a grim determination fired by the treacherous and unprovoked attack upon our lives and our security by the Japanese Empire. Personal passions and differences die in burning indignation.

Hot anger alone, however, is not enough. The fear of America's rising industrial might which has haunted the Axis powers must be made more than spectral. Relentless action must give increasing deadly substance to that fear until men once more live free in a world of peace.

Coal production can and must play a leading role in this achievement. That this or that commodity would win the war may perhaps have been worn threadbare with

repetitious employment by the sloganeers of 1917-18. Whatever its validity then, its truth is incontrovertible now. This above all is a war of materials—machines more than men. Production of this material, both raw and manufactured articles, is impossible without adequate fuel and transportation. This basic fact may have been obscured because rationing of coal so far has not been necessary, but there is no blinking it. What happened when the captive mines struck was a vivid demonstration of the dependence of the national defense program on an uninterrupted supply of coal.

The issue is no longer one between management and labor, between competing coal districts or between competing fuels. The issue is between a way of life dear to every American citizen regardless of rank, creed, race, position or occupation and a system which can survive only through the brutal destruction of democratic institutions. So defined there can be no question of the answer. We are Americans all and Americans first.

What of the Morrow?

WITH STEEL the mainstay of the defense effort, and becoming scarcer and scarcer as arming hits a faster pace, it seems quite possible that the supply for such common coal-mining uses as timbering, construction and the like, not to mention maintenance and repairs, will be curtailed more and more as time goes on. Coal-mine engineering and operating staffs, consequently, soon may be faced with the problem of using satisfactory substitutes.

For many applications, of course, there is no good, economical substitute for steel. The usual repair parts and maintenance materials for machines, preparation plants, power stations, etc., are good examples. Accepting this premise, mining companies can help under present conditions by resourcefulness in making use of materials at hand, care in eliminating waste, reclamation of all possible items, and training of employees to take better care of plant and equipment.

Other materials, many with valuable features of their own, are available as alternatives in mining applications. Treated timber is a long used and respected roof support of a permanent nature. A sand-cement mixture blown on with compressed air has given excellent results in a number of mines. Concrete or concrete blocks, brick and masonry may be used to support the top directly or hold up bars. The same material, depending upon the application, also serves well in construction of walls, foundations, buildings, tanks, bins and similar structures. Wood, rubber, tile, asbestos compounds and other materials are available for pipelines and resist corrosion.

The list of materials and applications might be continued indefinitely. Admitting that changes from present practices may be necessary, it would appear that now is the time to plan for a day when steel may not be readily available for all uses.

More Coal—Lower Cost

THE MORE a mechanical-mining unit produces, assuming no more men are required, the lower the cost of a ton of coal. And under some circumstances, additional men may be a paying investment. If bug-dusting, for example, cannot be done efficiently with the men available, tight falls may cause the loss of several tons a shift. If the loss was 15 tons a shift, selling at $2 a ton in the railroad car, it would seem that the wages of a bugduster would be returned several times over. Consequently, crew make-up might be scanned to see if adding a man or men somewhere in the cycle might not materially improve unit output.

Aside from crew size and make-up, many factors, some controllable and some not, influence unit output in mechanical mining. Among the controllable factors are a balanced cycle and balanced equipment capacity. Increasing car size, using rubber-tired equipment or providing some continuous means of transportation, such as conveyors, usually boosts capacity materially. Such equipment, however, generally necessitates a heavy investment, although the resultant cost reduction, in the case of new cars, for example, may be sufficient to more than return the outlay per car each and every working day. This is not merely theory, as experiences at a number of operations has demonstrated.

But can anything be done with a relatively small or no investment? Widening places, if other conditions permit, is one answer. The more coal per fall, the fewer equipment moves and fewer repetitions of the cutting, drilling, bugdusting, timbering and preparation cycle. Less, therefore, is spent in such non-productive activities, and more time consequently is available for the major activity: loading. The same result can be secured by increasing the length of the cutter-bar, assuming the machine motor can handle the additional load. With both wider places and deeper cuts, less drilling, explosive and other work and materials are required per ton, thus making the picture even more attractive. All these and other factors deserve careful consideration in mechanical-mining work.

Machine Fires

FIRE RISK to underground mobile machines need not increase by reason of the widespread adoption of hydraulic control which uses oil as the fluid. More attention, however, must be given to the cleaning of oil and dirt from ledges, corners and crevices of the machine. Recently some near disastrous fires have occurred in nests of oil-soaked coal dust, rubber cables and hydraulic hose. Oil leaking from the hydraulic system, plus the rubber hose itself, are new fuels for machine fires, and if the blaze is close to the oil reservoir the hazard is multiplied.

Sources of ignition of these fires, of course, should be eliminated as far as possible. That in itself calls for the very same preventive—cleanliness. Dirty and oil-soaked electric cables cannot be properly inspected for insulation damages which may be forerunners of arcs. Cotton waste or a rag hid in the dirt may cause spontaneous combustion. Cleanliness has always gone hand in hand with proper maintenance and safety; now the association has drawn closer.

Consolidation No. 32 "Float Kleen" plant.

5 x 3/8-IN. WASHED

At Consolidation No. 32 Plant

Equipped Especially for Stoker and Blends

By IVAN A. GIVEN
Associate Editor, Coal Age

TO CONTINUE to supply a uniform, thoroughly cleaned, accurately sized and blended product able to pass the scrutiny of the most hypercritical consumer, mechanical mining at No. 32 mine, Consolidation Coal Co., has been supplemented by a full-scale mechanical cleaning, screening and blending plant with a capacity of 450 tons per hour.

With a firm-structure coal, Consolidation No. 32, in the Fairmont field of northern West Virginia, has long been a leading producer of domestic fuel. The new plant for the production of "Float-Kleen" coal reflects the company's determination to maintain this position while securing for its customers and itself the full benefits of mechanical loading underground. The new preparation set-up permits unhampered operation of the loading machines and at the same time more than takes care of the greater irregularities and higher refuse content in the raw coal frequently to be expected in changing to mechanical operation. The result is a product even better than in hand-loading days, not only in the case of lump, egg and nut, but also in stoker and other smaller sizes, which previously had to be shipped without cleaning because hand picking was impracticable.

The No. 32 "Float-Kleen" plant, designed and built by the Fairmont Machinery Co. and using the Chance sand-flotation cleaning process (United Engineers & Constructors, Inc.), is equipped for washing 5x3/8- or 3x3/8-in. coal, bypassing the minus 3/8- for later remixing, blending or separate loading. To maintain the character of the domestic product, provision is made for removing from lump shipments for crushing and washing any soft or stained coal which orderly mining necessitates producing.

A remixing conveyor permits shipment of any desired combinations of the various washed and hand-picked sizes up to and including mine-run. Facilities to satisfy growing stoker demands include a complete stoker screening and loading plant. Shipment of uniform-consist high-quality nut-and-slack and slack sizes is insured by a blending plant with storage bins, proportioning feeders, loading boom and layer loading hoist. Primary, secondary and auxiliary crushing equipment permits breaking down a large percentage of the surplus coarse sizes to make stoker, nut-and-slack and slack sizes when the demand warrants. The blending plant, incidentally, insures uniform nut-and-slack and slack shipments when crushing.

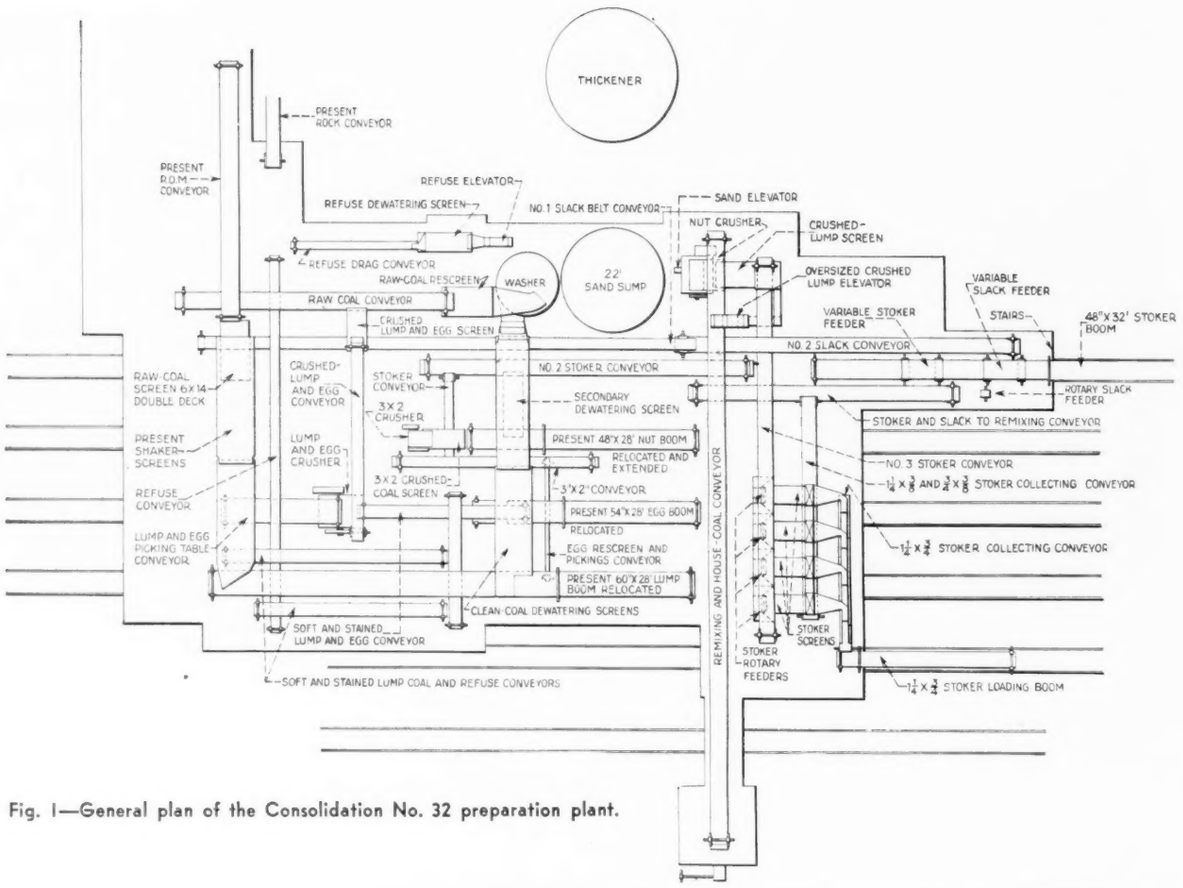
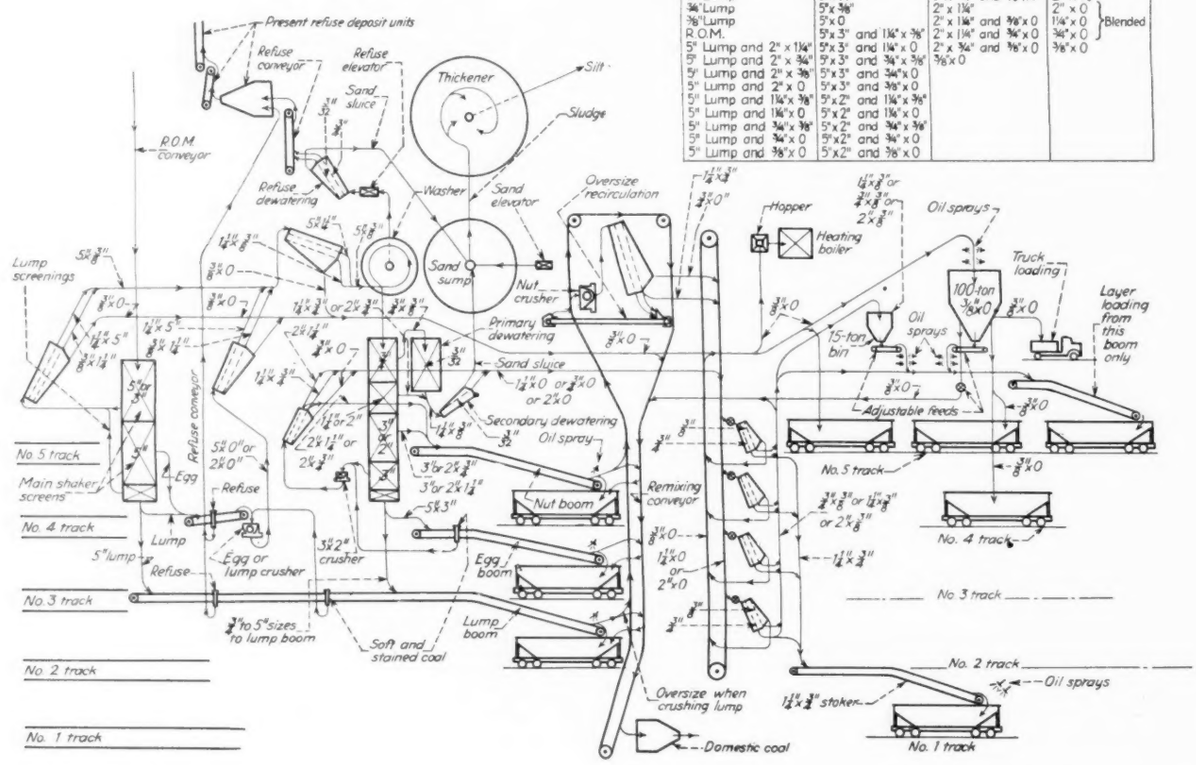


Fig. 1—General plan of the Consolidation No. 32 preparation plant.

Fig. 2—Flowsheet, No. 32 "Float Kleen" plant.

No. 1 Track 1¾"x ¾"	No. 2 Track	No. 3 Track	No. 4 Track	No. 5 Track
	5" Lump	5"x 3"	3½"x 1¼"	1¼"x ⅜"
	3" Lump	5"x 2"	3"x 1¼" and ⅜"x 0	¾"x ⅜"
	2" Lump	5"x 1¼"	3"x 1¼" and ¾"x 0	2" x ⅜"
	1¼" Lump	5"x ¾"	3"x ¾" and ⅜"x 0	2" x ⅜"
	¾" Lump	5"x ⅜"	2" x 1¼"	2" x 0
	⅜" Lump	5"x 0	2"x 1¼" and ⅜"x 0	1¼" x 0 Blended
	R.O.M.	5"x 3" and 1¼" x ⅜"	2"x 1¼" and ¾"x 0	¾" x 0
	5" Lump and 2" x 1¼"	5"x 3" and 1¼" x 0	2"x ¾" and ⅜"x 0	⅜"x 0
	5" Lump and 2" x ¾"	5"x 3" and ¾" x ⅜"	⅜"x 0	
	5" Lump and 2" x ⅜"	5"x 3" and ¾"x 0		
	5" Lump and 2" x 0	5"x 3" and ⅜"x 0		
	5" Lump and 1¼"x ⅜"	5"x 2" and 1¼"x ⅜"		
	5" Lump and 1¼"x 0	5"x 2" and 1¼"x 0		
	5" Lump and ¾"x ⅜"	5"x 2" and ¾"x ⅜"		
	5" Lump and ¾"x 0	5"x 2" and ¾"x 0		
	5" Lump and ⅜"x 0	5"x 2" and ⅜"x 0		



Although nut-and-slack and slack may be loaded through chutes at times, these, as well as stoker, nut, egg and lump, normally are handled by booms. A Viking dual system, including meters, controls and Viking treating boxes on booms or at the ends of conveyors, permits dustproofing all sizes with oil efficiently and economically. Accurate screening is insured by provisions for varying the dumping rate to take care of moist coal or excessive fines. Water is conserved by a thickener installation with the necessary auxiliaries.

The No. 32 "Float-Kleen" plant prepares coal from the Pittsburgh seam. The major impurities are the characteristic Pittsburgh-seam bands, varying in specific gravity from approximately 1.40 to 1.80, and sulphur in balls or lenses. The seam also contains soft layers, and occasionally soft or stained coal areas must be worked for orderly mining, although at No. 32, as at all Consolidation operations, the coal acreage is carefully tested by drilling and other means and operations are planned to prevent radical changes in coal quality.

Much of the original tipple equipment, including the mine-run shakers, was retained in constructing the new plant. The structure, however, was given new roof and sides and the original loading booms were moved downtrack and extended. Coal is hoisted up a short slope to a crossover dump by a car haul operated by a 40-hp. Louis-Allis "Adjusto-Spede" motor. With this motor, the dumping rate can be varied from 250 to 450 tons per hour to compensate for wet coal or increased fines and thus insure accurate screening. From the weigh basket the coal is chuted to an apron feeder powered by a 50-hp. "Adjusto-Spede" motor which permits matching feeder and car-haul speed.

From the apron feeder mine-run (Fig. 2) goes to the original tipple shakers, modified to make 5- or 3-in. lump and a minus 5- or 3-in. resultant. Or the shakers may make 5-in. lump, 5x3-in. egg and a 3-in. resultant, the egg going to a short apron conveyor for picking prior to crushing and washing. The 5-in. lump also may be bypassed to this same conveyor, which therefore can receive all coal from 3 or 5 in. up for picking and reduction prior to washing. Thus, when segregation of soft or stained output in the mine results in a large volume, it may be passed directly from the main shakers to the crusher. Or if the demand for stoker, nut-and-slack and slack warrants, 5x3-in. egg, or both egg and 5-in. lump, may be sent via this short cut to the crusher preliminary to washing and, if desired, further crushing.

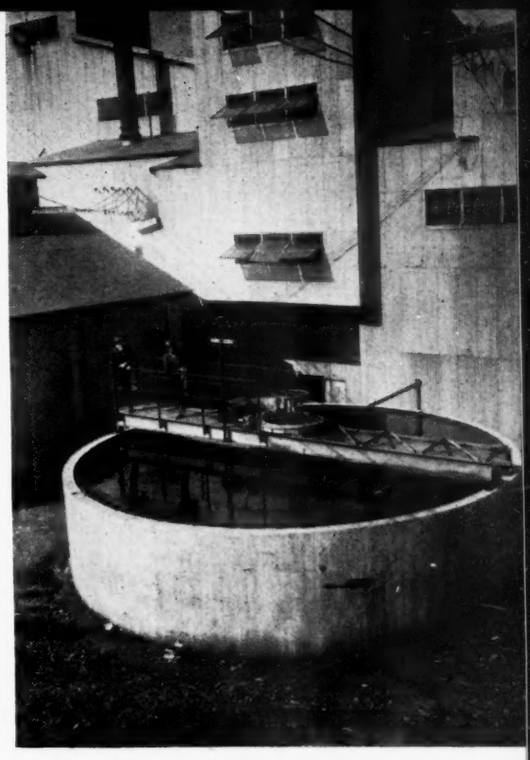
The primary crusher is a McLanahan & Stone 36x54 single-roll machine with motor-driven roll adjustment. It reduces the feed to minus 5 down to minus 3 in. Settings for maximum efficiency with minimum oversize were determined by actual tests and are marked on the unit. The same procedure was followed with all other crushers.

Unless soft structure or stain necessitates crushing lump, or unless it is broken down in making stoker and slack, it normally passes over a rescreening section and onto a 60-in. apron-type picking table-loading boom especially designed for removal of soft, stained or banded lump. Low sides and platforms facilitate sliding lumps off and, if necessary, splitting them to eliminate bands, stained faces, etc. Ten pickers may work, although four is the usual number.

Separate Picking Provided

Separate picking boxes are provided for pure refuse and soft, stained or banded coal. Pure refuse goes to a collecting conveyor discharging to No. 2 refuse conveyor (30-in. scraper) direct to the final refuse bin. Soft, stained or banded coal falls onto a second collecting conveyor feeding to auxiliary scraper conveyors to the lump and egg crusher previously mentioned. Crushed coal is conveyed on a 30-in. scraper to a 4x10-ft. double-deck Robins "Gyrex" screen, where the minus $\frac{3}{8}$-in. is removed for bypassing around the washer. With this arrangement, soft, stained and banded coal is removed from the 5-in. lump, leaving a clean hard product which, after dustproofing with oil, may be loaded. Or, by elevating the boom, lump can be run into the remixing conveyor for movement to a house-coal bin with undercut gate for loading trucks standing on Fairbanks scales below.

The final product on the main shakers (minus 5- or minus 3-in. resultant) is discharged onto a 6x14-ft. double-deck Robins "Gyrex" screen. Plus $1\frac{1}{4}$-in. coal is scalped out on the top deck to facilitate removal of the minus $\frac{3}{8}$-in. through the bottom deck. This minus $\frac{3}{8}$-, plus the minus $\frac{3}{8}$-made on other raw-coal vibrators (Fig. 2), is bypassed around the washing unit for remixing or transportation to the blending plant by



Thickener at No. 32 conserves water.

means of a 30-in. scraper conveyor. The 5x$\frac{3}{8}$- or 3x$\frac{3}{8}$-in. raw coal goes to a 42-in. chain conveyor, which also receives plus $\frac{3}{8}$-in. crushed coal. This conveyor discharges to a 6x12-ft. double-deck rescreening vibrator (Robins "Gyrex") for final removal of minus $\frac{3}{8}$-in. coal from the feed to the washer.

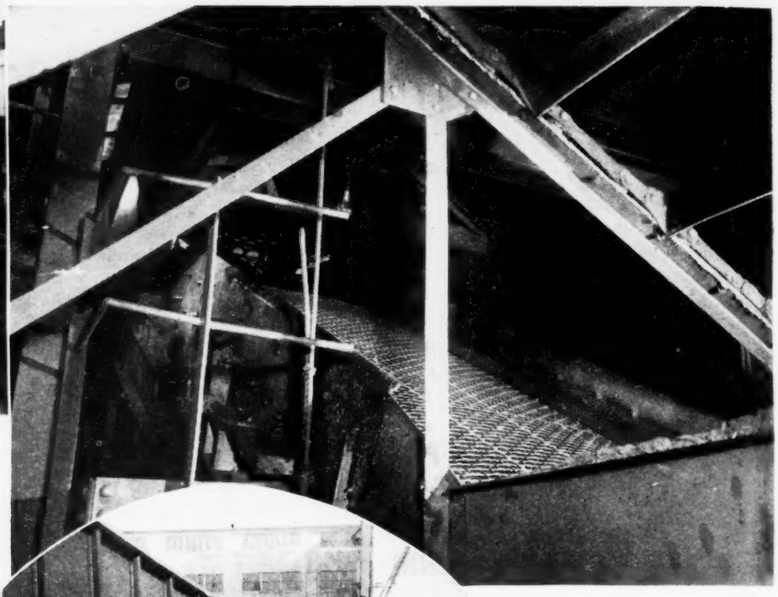
Washing is done in a $13\frac{1}{2}$-ft. Chance cone with sufficient reserve capacity to enable it, when crushing is being done, to clean the entire input to the plant after removal of the minus $\frac{3}{8}$-in. Ordinarily, the cone receives natural 5x$\frac{3}{8}$-in. raw coal and crushed soft, stained or banded lump. Air-operated refuse gates are controlled through a General Electric-Chance panel. Usually the upper gate is opened $1\frac{1}{2}$ minutes, followed by a $\frac{1}{2}$-minute interval before opening the lower gate.

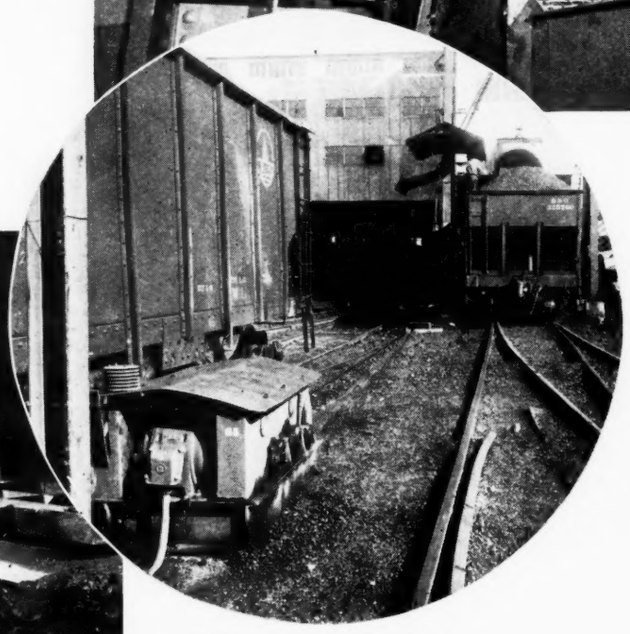
Cleaning is done at a 1.45 gravity to insure efficient removal of banded material ranging, as stated, from about 1.40 to 1.80. Experimental operation at 1.50 and slightly higher revealed that the possible saving in coal was more than offset by a higher band percentage in the cleaned product, notably the egg and nut.

For control work, the $1\frac{1}{4}$x$\frac{3}{8}$-in. clean-coal and 5x$1\frac{1}{4}$-in. refuse sizes have been found representative of cone performance. Sampling for quality control normally is done once an hour. Results for a typical shift in September (five control samples) are shown in Table I. On this day, average sink in the clean $1\frac{1}{4}$x$\frac{3}{8}$-in. coal at 1.45 was 0.6 per cent. Average float in the 5x$1\frac{1}{4}$-in. refuse (same gravity)

Washing is done in this 13½-ft. cone, which is preceded by a vibrating screen removing the last of the minus ⅜ from the raw feed.

Located underneath the mine-run shakers, this vibrating screen removes minus ⅜-in. from 5x0- or 3x0-in. coal to be washed.

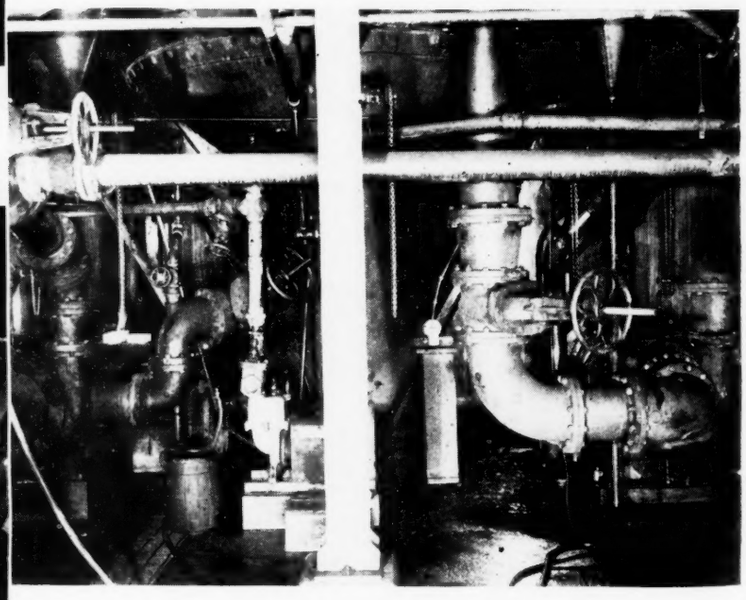




Blending-plant loading boom, with the layer-loading hoist in the foreground.

Lump picking table.

Stoker screens at No. 32 in action, with the star feeders in the rear.



At right is the circulating-water pump serving the cone, with the sand pump at the left. The small centrifugal in the center, with float control, pumps silt to the thickener.

was 0.1 per cent. Averages for three months (around 5,000 tons per day of two shifts) were: July—float in the 1¼x⅜-in. cleaned coal at 1.45, 0.4 per cent; sink in the 5x1¼-in. refuse at 1.45, 0.5 per cent; August—float, 0.3 per cent; sink, 0.2 per cent; September—float, 0.6 per cent; sink, 0.1 per cent. Average reject in preparation, exclusive of sludge, is 6 to 7 per cent.

Refuse is discharged into a bucket elevator which lifts it to a 4x8½-ft. double-deck Robins "Vibrex" desanding and dewatering screen—¾-in. round-hole equivalent cloth on the top deck and 3/32-in. equivalent (stainless steel) on the bottom. Sand and water are sluiced to the sand sump, while the desanded and dewatered refuse goes into an 18-in. scraper conveyor to the final refuse bin.

Clean coal (5x⅜- or 3x⅜-in.) flows with the sand and water to 7-ft.-wide Parrish-type dewatering, desanding and sizing screens with round-hole plate as follows: ¾-in., 105 sq.ft.; 1¼-in., 70 sq.ft.; 2-in., 140 sq.ft.; 3 in., 112 sq.ft.; in addition to 140 sq.ft. of step screen and 3/32-in. round-hole 16-gage stainless steel plate on the dewatering and desanding deck. This latter deck receives the ¾x⅜-in. washed size which, with the 1¼x¾, goes to a 6x14-ft. double-deck Robins "Gyrex" screen (¾-in. round-hole equivalent cloth on the top deck and 3/32-in. on the bottom) for final dewatering and desanding.

Sand and water from both the primary and secondary operations is sluiced to a 22-ft.-diameter sump. Clarified water is returned to the cone by a 3,300-g.p.m. Morris centrifugal (75-ft. total dynamic head). Sand is returned by a 1,500-g.p.m. Goyne centrifugal (35-ft. total dynamic head) with Dayton "Cog Belt" drive and constant and variable-speed pulleys.

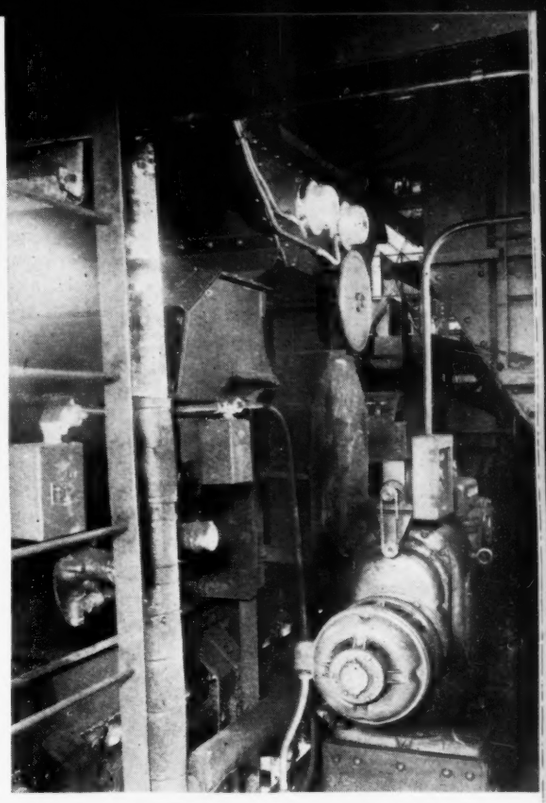
The sump is equipped with an outer ring, with pipes to a sump for bleeding off silt. From the sump a Barnes 200-g.p.m. centrifugal pump (float-switch control) pumps the silt and water to a thickener. Installed to conserve water, the thickener comprises a concrete tank 22 ft. in diameter and 8 ft. deep with Dorr Type A thickener mechanism. Clear water overflows to a steel sump and is returned to the cone system by a 175-g.p.m. Barnes centrifugal, also with float control. Sludge, or silt, from the thickener is pumped away by a Goyne 3½x9 duplex double-acting outside-connected end-packed plunger pump with special silt-handling water valves and bronze plungers on the water end.

Deep-Well Pump for Water

Fresh make-up water normally is obtained from a combination of mine and deep-well flow, plus city water when necessary. The small non-acid mine flow goes into the well, and the combination is pumped to a storage tank by a Cook deep-well turbine pump with U. S. vertical ball-bearing motor. From the storage tank the water flows to sprays on the washed-coal dewatering and desanding shakers and to glands on the pumps.

Various lump sizes down to ¾ in. may be made by closing gates on the dewatering, desanding and sizing shakers, as indicated in Fig. 2. These may be run to the lump boom for loading or transfer to the remixing and house-coal conveyor. If egg (5x2-, 5x1¼- or 5x¾-in., depending on gate settings) is being shipped, it is discharged onto an apron-type boom with a horizontal picking run to permit, if necessary, removal of soft and/or stained coal for crushing and re-treatment.

The 3x2-in. size from the washed-coal shakers normally is crushed and rescreened to make stoker, although it may be combined with the usual 2x1¼- or 2x¾-in. nut to make a 3x1¼- or 3x¾-in. nut, or with the 5x3-in. to make a 5x2-in. egg, or with the 5-in. lump in making 2-in. or smaller



Looking toward the 15-ton bin in the blending plant, showing part of the variable-speed drive, controls and oiling equipment, as well as two bin-level indicators.

lump, as indicated in Fig. 2. Usually, however, it is conveyed (24-in. scraper unit) to a Pennsylvania 24x32 single-roll crusher for reduction to minus 2-in. The crusher discharges to a 3x8½-ft. Robins "Vibrex" screen, separating the coal into 2x1¼- and minus 1¼-in. fractions. The former (or nut) size goes to the nut boom, where it joins the natural nut for loading or remixing. Minus 1¼-in. from the crushed 3x2 goes into the No. 1 stoker conveyor (18-in. scraper), which starts it on its way to the stoker-coal screening installation. The 1¼x¾- and ¾x⅜-in. sizes also go to the stoker-coal plant, the latter after preliminary and final dewatering.

To add to the output of stoker and nut-and-slack and slack sizes, the remixing and house-coal conveyor (42-in. scraper unit) also is arranged to feed to a secondary crushing plant handling nut (Fig. 2). This plant is designed for present crushing of any two prepared sizes to minus 1¼ in., with provision for increasing the number of crushed-coal screens to permit breaking any two sizes to minus ¾ in. The crusher, fed by the top strand of the remixing conveyor, is a McLanahan & Stone 24x72 single-roll "Black Diamond" automatic "Steel Strut" quick-adjustment machine. It discharges to a 5x10-ft. double-deck Robins "Gyrex" screen making plus 1¼-, 1¼x¾- and minus ¾-in. sizes.

Table I—Method of Reporting on Washery Operation at No. 32 Mine

Consolidation Coal Co.
Chance Cone—Daily Washery Report
Shift: *Day* Location: *Owings, W. Va.* Sand: *50 P3* Date *9/30/41* Washing Gravity: *1.45*

Time	Gravity Valve Setting: Classifier Column	No. 1	No. 2	No. 3	No. 4	Ammeter, Sand Pump	Agitator R.P.M.	Circulating Pump Gage	Trapping Cycle	Sinks, Clean Coal: Pounds Sand Added	Size, Inches	Per Cent	Per Cent Float in Refuse
7:30	¾	1¼	1¼	1¼	1¼	88	8	34	1½x½	...	1½x¾	...	...
8:30	¾	1¼	1¼	1¼	1¼	88	8	34	1½x½	500	1¼x¾	0.7	0.1
9:30	¾	1¼	1¼	1¼	1¼	88	8	34	1½x½	...	1¼x¾	0.6	0.1
10:30	¾	1¼	1¼	1¼	1¼	90	8	34	1½x½	...	1¼x¾	0.7	0.0
11:30	¾	1¼	1¼	1¼	1¼	90	8	34	1½x½	500	1¼x¾	...	...
12:30	¾	1¼	1¼	1¼	1¼	92	10	34	1½x½	...	1¼x¾	0.5	0.1
1:30	¾	1¼	1¼	1¼	1¼	92	10	34	1½x½	...	1¼x¾	...	...
2:30	¾	1¼	1¼	1¼	1¼	90	10	34	1½x½	...	1¼x¾	0.5	0.1
Average:												0.6	0.1

Remarks:

Operating Engineer

The plus 1¼-in. goes into a bucket elevator for return to the crusher. The 1¼x¾- and ¾x0-in. sizes go into the No. 3 (36-in. scraper) conveyor feeding the stoker screens, which also receive 2-, 1¼- or ¾x⅜- from the washed-coal screening and crushing units. Nut coal from the mine-run can be crushed to minus ¾-in. with the present crushed-nut screening facilities.

Stoker is produced on four 4x10-ft. double-deck Robins "Gyrex" screens. Two or three normally can handle the tonnage, but the fourth is available in case much crushing is being done or the feed increases for any other reason. The No. 3 stoker conveyor discharges into small surge hoppers followed by star feeders driven from a line shaft by a Link-Belt "P.I.V." variable-speed gear. The speed normally used was set by tests on screening efficiency, which is promoted by the even flow of coal from the feeders.

The 1¼x¾-in. size from these screens is the major stoker coal shipped, although, as indicated in Fig. 2, 2x0-in. coal may be screened, making possible a 2x¾-in. nut. Other nut sizes, such as 2x⅜-, 1¼x⅜- and ¾x⅜-in., also can be prepared to meet the varying requirements of both industrial and domestic consumers by recombining the various fractions made on the stoker vibrators and conveying them to the boom ordinarily employed in making blends. Or these sizes may be placed in one of the blending-plant bins or returned to the remixing conveyor, as shown in Fig. 2. Minus ⅜-in. coal also may be returned to the remixing conveyor or (via No. 2 slack conveyor) may be run to loading chutes on the slack track, to the heating-plant bin, or to the second blending-plant bin. When 1¼x¾-in. stoker is being shipped, it is discharged from the screens onto a 24-in. collecting belt feeding through an oiling hood to a 36-in. boom.

A 100-ton bin for ⅜x0-in. coal, a 15-ton bin for 2x⅜-, 1¼x⅜- or ¾x⅜-in. sizes, variable-speed feeding equipment with proportioning gates and automatic controls, a loading boom and a layer-loading hoist, supplemented by oiling equipment and other auxiliaries, comprise the blending installation at the No. 32 "Float-Kleen" plant. The 100-ton bin, in addition to the regular opening to the feeder, also is equipped with side chutes to either trucks or railroad cars on No. 5 (slack) and No. 4 tracks. Still another side-opening chute with a variable-speed star feeder permits returning minus ⅜-in. to the remixing conveyor at any desired rate.

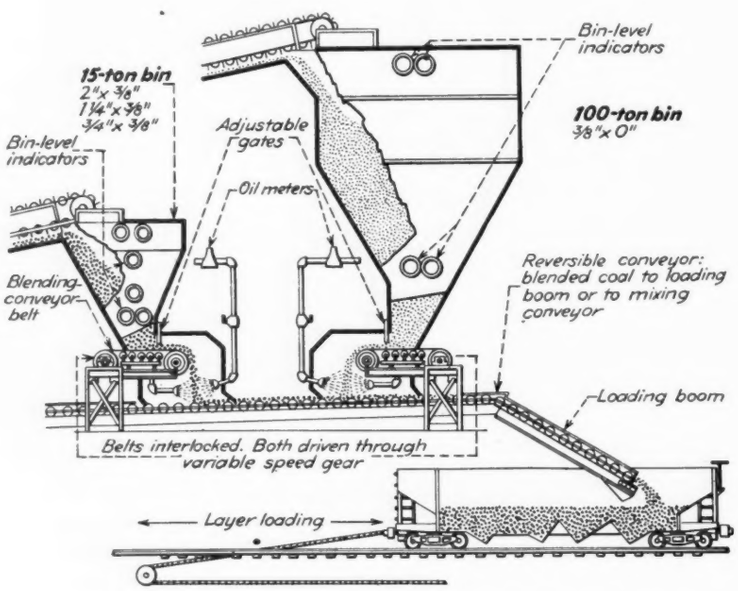


Fig. 3—Diagrammatic sketch of the No. 32 blending plant.

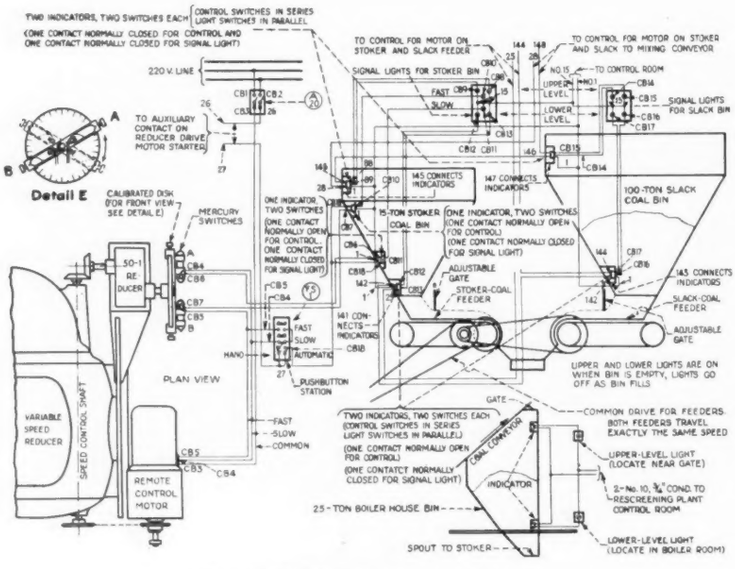


Fig. 4—Blending-plant control system.

Size Fractions Controlled

The blending plant has as its objective the shipment of nut-and-slack and slack sizes with the various size fractions definitely controlled even though mine conditions or crushing may result in frequent and wide changes in production of these various fractions. Thus, it is possible to ship a car of a particular size consist today and an exactly similar one a month or more later.

Both the 15- and 100-ton bins are equipped with gates to alter the depth of the streams of coal being fed out and thereby the relative proportions of the minus ⅜-in. on the one hand, and the 2x⅜-, 1¼x⅜- or ¾x⅜-in. on the other, included in the combination being shipped. The feeders (interlocked so that both run at the same speed) are short belt conveyors with oil-treating hoods at the ends, as indicated diagrammatically in Fig. 3. The feeder beneath the 15-ton bin is driven through a Link-Belt "P.I.V." variable-speed gear and in turn drives the unit beneath the 100-ton bin. The blend is made on a pan conveyor with a hinged boom end for loading.

Four "Bin-Di-Cators," with signal lights outside where they can be seen

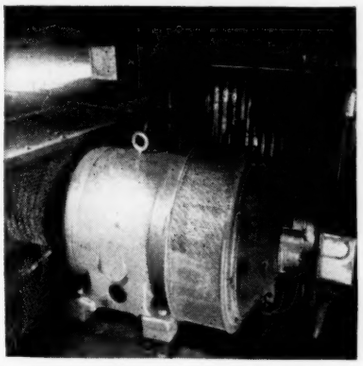
by the car trimmer, are installed on the 100-ton bin—two at the top and two at the bottom—to indicate full and empty conditions. Six similar units, also with signal lights outside, are installed on the 15-ton bin. Two at the top indicate full and two at the bottom indicate empty. A fifth is installed just above the bottom units, with a sixth just below the top ones. These two "Bin-Di-Cators" actuate a small motor on the speed-changing shaft of the "P.I.V." gear. Thus, when the 15-ton bin begins to fill, the feeders speed up until the level gets down to the lower of the two indicators, whereupon they automatically are thrown on "Slow." Consequently, as long as coal comes in normal volume, the level plays back and forth between the two intermediate, or regulating, "Bin-Di-Cators."

Two mercury switches on a disk driven through a reducer from the "P.I.V." speed-changing shaft act as limits in the speed-changing operation. Thus, when an indicator calls for a change in speed, the disk (Fig. 4) rotates until the mercury in the corresponding switch opens the circuit and stops the speed-changing motor. Setscrews permit clamping the mercury switches at various points on the disk, which is calibrated to provide a choice between various low and high speeds. The extreme low "Bin-Di-Cators" on both bins act to shut off the feeders when either runs nearly empty. And when the level in one or the other reaches the top, sufficient equipment is stopped to arrest the flow of coal.

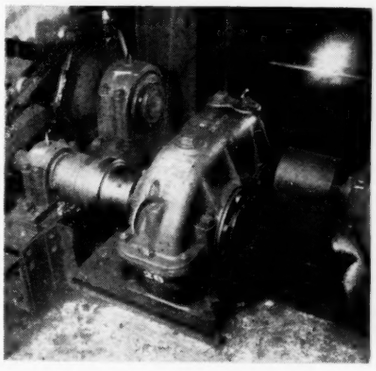
Smaller Bin Possible

The speed-changing control system (Fig. 4) is arranged for hand as well as automatic operation. This system made it possible to operate with only a 15-ton bin for the 2x$\frac{3}{8}$-, 1$\frac{1}{4}$x$\frac{3}{8}$- or $\frac{3}{4}$x$\frac{3}{8}$-in. sizes, instead of a much larger one. The small bin can be emptied quickly if necessary in changing sizes. As stated, the blending plant includes complete oiling facilities and a Brown-Fayro layer-loading hoist. Use of the latter insures a more even distribution of the various size fractions throughout the railroad car.

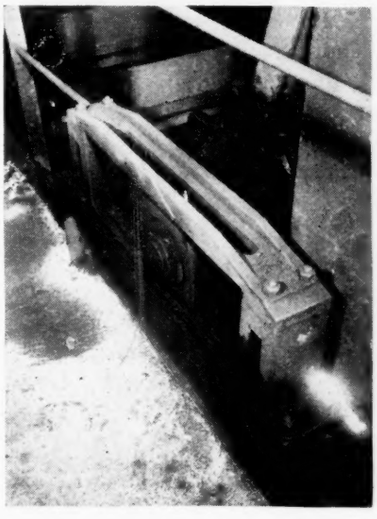
The equipment in the No. 32 "Float-Kleen" plant, exclusive of motors on the "Trane" unit heaters supplied with steam from a Kewanee boiler fired with minus $\frac{3}{8}$-in. coal by a "Firite" stoker, and on certain other auxiliaries, such as a screen-changing hoist, etc., is operated by 78 motors totaling 1,153 hp. Fractional horsepower units, aside from those on the items mentioned just above, total four in number. Others are as follows: 1 hp., 1; 2 hp., 3; 3 hp., 6; 4 hp., 2; 5 hp., 22; 7½ hp., 9; 10 hp., 8; 15 hp., 8; 20 hp., 1; 25 hp., 3; 30 hp., 2; 40 hp., 2; 50 hp. (mine-run feeder, mixing conveyor and 3x2-in. crusher), 3; 60 hp. (slate belt conveyor), 1; 75 hp. (lump and egg crusher), 1; 100 hp. (recirculating pump), 1; 125 hp. (nut crusher), 1. Practically all are General Electric units, the exceptions including certain small motors, the Louis Allis "Adjusto-Spede" units, Robbins & Myers motors on the boom hoists and the U. S. Electrical vertical motor on the deep-well pump. General Electric types include K, KF, KG, KR, KT, FTR, MT and MW. In addition to ball bearings on motors on the circulating pump and the small pumps serving the thickener, all motors on the vibrating screens, compressor, layer-loading hoist (Westinghouse Type CS), and some conveyors also are equipped with ball bearings.



This adjustable-speed motor drives the mine-run apron feeder.



Showing one of the anti-friction-bearing pillow-block installations on a conveyor.



One of a number of anti-friction-bearing conveyor take-ups.

Anti-Friction Bearings Used

Power-transmission equipment includes Dayton "Cog Belts" on the vibrating screens, sand pump, mine-run and washed-coal shakers and (with spur gears) silt pump and crushers. Conveyor drives mainly are Jones herringbone speed reducers in tandem with cut-steel spur gears, supplemented by Cleveland worm reducers and spur gears for certain applications. Belt conveyors include Link-Belt anti-friction idlers and U. S. "Royal" belts. Jones Timken-bearing pillow blocks are used on all shafts 5 in. or less in diameter. Others are Fairmont standard. Jones-Timken take-ups are installed on most of the conveyors; others, Fairmont standard.

Motors of 50 hp. and less operate on 220 volts a.c.; larger units (four) on 2,200 volts. Starters for motors of 25 hp. and less are General Electric combination CR7008 magnetic-type units with air circuit breakers; 30 to 50 hp., Class CR7006; over 50 hp., Type CR1034 manual starters. All wiring is inclosed in conduit, with flexible conduit for connections to the motors.

The plant is housed in a steel building with "Cop-R-Loy" 22-gage roof and 24-gage siding. Except for steel grating on the cone level, all floors are 4-in.-thick reinforced concrete. Stairs are constructed with channel stringers and channel treads filled with concrete. Steel-bar and rod handrails are used. All gears, V-belts and other drives are inclosed in guards. Corrugated wireglass skylights aggregating 500 sq.ft. are installed over the picking tables and elsewhere. A special maintenance (p. 92) routine has been established.

Refuse may be trucked away but normally goes to a belt conveyor which takes it up to a bin on the hill, from which it is handled by a larry.

FOURTH OF A SERIES OF ARTICLES
ON HUMAN RELATIONS AND PERSONNEL BUILDING
IN THE COAL-MINING INDUSTRY

GOOD WORKING HABITS

Promote Safety and Efficiency; Proper Training Insures Their Development

Experience has shown that as many workers fail to learn an operation and adjust themselves to a job because of improper methods of training as fail because of lack of ability to learn. Bad work habits frequently ruin what otherwise would be a good workman because they are so hard to unlearn. Because an older experienced worker can do a job is no reason to assume that he is a good teacher and can instill the proper working habits. Good instructors must have the proper qualifications and they should be selected with care.

By O. G. VAN CAMPEN
Consultant, Industrial Relations

LEARNING the hard way seems to be the usual thing in coal mining. Most of this trial-and-error education is a byproduct of working and the men are hardly aware of what, if any, they have learned at the end of the day. Superintendents and mine foremen often concentrate so strongly upon getting a job done that how it is done gets little attention. The job seems to be the thing, and the man comes in a poor second. He must bend and twist himself to fit the conditions underground, since the conditions rarely are bent and twisted to fit him. And in the process of training men to operate machines, the machines often dominate.

Learning often is a tough experience for the newcomer, as well as the old hand in a new kind of work. The "teach-that-new-guy-a-lesson" system often deals out some stiff shocks. A case in point was that of a man learning to drill coal. He was standing in the wrong position with his body bent over the drill. The assistant foreman sighted him and, walking up, held out a piece of brattice cloth so that it caught in the auger. As the drill spun the cloth, he turned to the startled learner and barked: "That's what will happen to your clothes if you don't watch out." In another instance, a mine foreman, when he saw a man without goggles, had the trick of walking up and handing him a glass eye.

Tradition exerts a powerful influence over the learning process. Although there are exceptions, the method usually is "Tell 'em! Show 'em! Inspect 'em! Penalize 'em!" The foreman feels that if he tells a man what to do and how to do it and then gives him a demonstration the man ought to learn as a matter of course. To do more, many foremen feel, would be treating a man like a "panty waist."

Old ways of doing things, old working habits—some good, some bad—still are the practice because of the way a new man is broken in. Letting the apprentice "buddy" with an old employee, for example, while it has certain advantages, often results in the beginner acquiring bad working habits and an idea that poor workmanship is acceptable.

Habits are the way we do things, and the way we do things, after sufficient repetitions, becomes so ingrained that we function automatically without having to stop to think. At one time in our lives, we had to exercise great care in each step to maintain our balance. Now, we do it automatically.

Consider another habit that all men must acquire: shaving. We follow the same routine every time, and have learned it so well that we can plan our day or even carry on a healthy argument with the wife while the job goes smoothly along. But if you want to test out the difficulties involved in acquiring a new habit, try working with a new razor, start on the other side of your face and use your left hand. You will be lucky to get through the job without slashing yourself, and may wind up by throwing the new razor away as a poorly made gadget, whereas the real difficulty was working against your old habit pattern.

What is true of learning a new shaving method is just as true of learning a different way of operating a drill, a locomotive or a loading machine, laying track, putting up wire or handling a shovel. Good training enables a worker to develop the proper habits, and, as we have just learned, once a man has developed good habits it is mighty difficult for him to pick up bad ones. By the same token, when a bad habit is once ingrained it is difficult to remove.

Learning is acquiring the right habits to do a specific job. When the building of habit has reached the point where what is to be done automatically is done correctly, both as

to time and quality, ability has been achieved. Thus, ability is possession of the necessary habits that make for accomplishment.

If training is approached in this way, we realize the great importance of job analysis discussed in previous articles in this series (September *Coal Age*, p. 43; November, p. 45). Each operation, each job, must be broken down into what often are called "teaching units." The muscular action and mental effort called for in each unit are carefully studied and described. The teaching units then are laid out in a learning sequence. The action, or performance, in each unit is made to flow into the next. In this way, a learning progression, or pattern, is formed. The important point is that the learner is not taught each unit separately. On the contrary, he is taken through all the units with his attention constantly directed to the operation as a whole. Attention is given, of course, to the particular units with which the learner has trouble. The object of the training must always be instilling complete and correct work habits.

Men Learn By Doing

While the spoken word is a necessary part of teaching, telling a man will not make him learn. The old axiom that we learn by doing still holds. There is a vast difference between knowing how to do a job and actually doing it. No amount of telling a worker how to use his arms and hands will do the trick. He must go through the routine himself, and must be carefully guided in the process. When he goes wrong he must be stopped immediately and again shown the right way. He must be saved from doing the wrong thing in order to leave in his mind nothing but the right.

Habits of safety can and should be incorporated into working habits. Workmen can be taught at the very beginning that good workmanship consists not only of orderly habits and accurate habits, but also safe habits. If a good job of teaching is done, safety work is lightened accordingly.

In training workers, sharp discrimination must be made between teaching them how to do a job and helping them learn. It is the worker—and learner—who must acquire the habits and develop the skill. Learning cannot be poured into a man. It must be drawn out of him by enabling him to do the thing he is required to do. The learner must be studied. His ways of learning, his speed in acquiring the necessary information, must be thoroughly understood. How much he takes in, how much he gets onto, how much he can actually do, are the all-important things.

Experience has shown that men vary widely in ability to learn. Some easily retain what is taught them, while others must have it repeated many times. Some learn readily through their ears, while most learn best through their eyes.

The emotional make-up of the learner must be given close attention. Many men approach the task of learning with fear and anxiety. They feel ashamed of their awkwardness and will do anything to avoid a bawling out. Sometimes this emotional disturbance makes a learner appear stupid when actually he is not. Teaching is easy when the learner is confident, enthusiastic and not afraid of constructive criticism. The point is, the instructor must modify his teaching methods to suit the man if he is not to be made to feel inferior or unequal to the task.

The job or machine must not be allowed to dominate the learner. The complexity of the entire job or the hazards in the operation of a machine must not be brought out too soon or unduly dramatized to impress the new man. During the training period, the man and his learning task are the important things.

Good Instructors Necessary

Great care should be given to the qualifications of instructors and their selection. Instructors for training men in mine operations should be selected from the organization, as it is obvious that a man cannot train others unless he himself can do the things he attempts to teach. If an instructor is brought in from the outside, he should spend sufficient time at the face to understand thoroughly just how the work is done. An instructor without face experience should not attempt the teaching of miners, as they will have no confidence in one who cannot talk their language.

An instructor must be enthusiastic and alive so he can make the learner feel the same way. He must be capable of looking at the job through the learner's eyes and presenting his subject from the viewpoint of the observer. Above all, he must be a man who likes people, a man who likes to teach.

Time periods should be carefully set at the start and the time to be spent by the learner on each unit of the operation should be wisely planned so that he will not grow stale and lose interest, and also so that the instruction period will be completed in the shortest possible time. The learner should be closely supervised, particularly during the early stages of his training, to prevent him from picking up bad habits or wandering around like a lost lamb. Provision should be made for the proper variation in tasks so that monotony will not result in flagging interest. Hours spent in training should be carefully regulated to prevent errors due to fatigue or retarded progress due to strain. Reasons why things are done as they are should be included in the program, as working in the dark adversely affects the will to learn.

Reasons Why Are Important

The importance of giving reasons why may be better appreciated, perhaps, by considering the attitude of many miners toward sounding the roof when they enter their working places. Many neglect it even after frequent scoldings from the assistant foreman. It is safe to say that these men don't know what they are sounding for. What they feel through their fingers has no significance to them since they know nothing about rock and how it acts. Therefore, since they can't get anything from sounding, they have no real desire to do it. Where there is no desire a man doesn't learn.

Some form of graph or chart should be provided to show the learner how he is getting along. Nothing makes a man learn more rapidly or happily than an assurance that he is making good. Training must be planned so that the learner feels a definite sense of working step by step to the desired goal. All material should be closely related. Correct procedures and systematic training periods result in increased speed and accuracy in learning.

When a training program is introduced, part or all the course should be given the supervisors first. Where this cannot be done, supervisors should at least be brought together and thoroughly acquainted with the standard practices to be introduced in the training. Examples set by supervisors have a definite effect—for good or ill—upon the work habits of the learner and the standard of his performance.

Too much emphasis cannot be placed upon the importance of good

foreman training. When all is said and done, the foreman and his assistants actually set the standard of quality in workmanship and safety. The attitude and manner of these supervisors also set the keynote, or level, of the human relations.

Training for supervisors is most successful when it is developed and built up by management itself. Most so-called foremanship courses do only part of the job. They contain much that is not directly related to coal mining and all too frequently their language is not that of the men at the mines. Some colleges supply very helpful advice and their counsel often is valuable in building up the course structure. The actual material, however, gets the best results when it is derived from within the organization.

[SECOND OF A SERIES OF THREE ARTICLES ON ORIGIN AND MEANING OF POWER FACTOR]

LOWER COSTS—

That's Why Alert Management Studies How to Improve Uneconomic Power Factor

By FRED W. RICHART
Editorial Staff, Coal Age

THERE are many conditions under which the improvement of low power factor may be advisable. The reason for making such improvement in one case may be very different from the need for it in another case. Primarily, it is to save money by the reduction of power bills or by increasing the capacity of power lines and generating equipment, without adding to them physically.

A pick-and-shovel miner who had followed the progress of a new capacitor installation was puzzled, for he saw no wheels, gears or belts to indicate motion. Finally, his curiosity was raised to the point of asking, "What does it do?"

"It saves money," was the crisp reply.

That was, literally, the correct answer in that case, for it was installed to lower the demand charges of the power bills.

Specifically, the improvement of bad power factor may do one or more of several things:

1. The first actual thing it does is to bring current more nearly, or completely, in phase with impressed voltage. The immediate result is to lower the current for a given load and reduce heat losses in conductors proportionately to the square of the current before and after correction. Please reread the first sentence of this paragraph. We are in the habit of stating it that way, but that is really not correct. What actually happens is this: We add leading reactive kva. to bring current into phase with the voltage wave, and that is what improves power factor. Some may think to turn that first statement around is straining a point. But when you think it over you will see that is correct. Stepping up lagging current is first; improvement of power factor follows.

2. The reduction of conductor losses, nominally called I^2R (heat) losses, immediately raises delivery voltage, which reacts to further decrease motor current until a stable condition is reached—I^2R = amperes x amperes x ohms resistance.

3. This reduction of line current also reduces heat losses in transformers and generators, for the beneficial effect extends from the point of correction to the generating station. It effects a power saving, for a reduction of heat losses means a saving of that much power.

4. Since current savings mean an actual increase in line and generator capacity, most power companies credit the customer with a part of the sav-

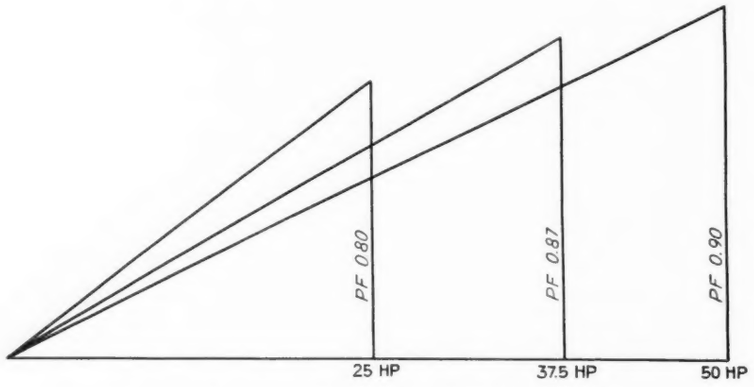


Fig. 6—Showing how power factor varies with loading of 50-hp. motor.

ings, and reduce demand charges proportionately, within certain limits.

5. The final effect on the power user is to save money, provided the investment is not too great and provided the power consumed in making the correction does not outweigh savings. In any event, voltage is raised to a more satisfactory level, motors run cooler, have higher torque, and the life of motor and control is extended.

There are several ways of improving power factor, some of which we shall discuss. And there are two conventional types of apparatus used to raise power factor by substantial amounts. They are the synchronous motor and the capacitor.

One means of improving power factor without additional apparatus is the use of modern equipment of the correct size and type, loaded to nearly normal rating. Lightly loaded induction motors, whether large or small, have poor power-factor characteristics. Slow-speed induction motors have decidedly poorer power factor than moderate or high-speed motors. Exceptions, which may not prove the rule, are 3,600-r.p.m. motors, which are not as good as 1,800-r.p.m. motors. Improvement of power factor with increase in size is not so marked after passing 50 hp. in high speeds and 100 hp. in low speeds.

Speed and Rating Count

So, from a power-factor point of view, the selection of moderate- or high-speed motors (except 3,600 r.p.m.) of large hp. rating, is conducive to better over-all power factor in any electrical installation. But, much more important than motor size, they should operate at or near normal rating, for badly underloaded induction motors have very low power factor. As previously noted, the reason is easily understood, for, excitation amperes persist, while power amperes drop with the load. A glance at Fig. 6, showing the power-factor diagram of a 50-hp. 1,200-r.p.m. 440-volt squirrel-cage motor at full, three-fourths and one-half loads, impresses this point on the mind.

Now we will consider the apparatus usually used for power-factor correction. Rotary condensers and synchronous motors have been used for many years. Synchronous motors of mining motor-generator sets have been designed for 0.8 power factor, as a customary standard, and are thus able to furnish leading rkva. equivalent to 60 percent of their normal kva. rating. So, a 435-kva. motor can furnish 261 rkva. (leading) at full load, normal voltage and normal overexcitation. In the past, there was some practical difficulty in maintaining a uniform rkva. because of the fluctuating loads on m.g. sets. Mechanized mining has simplified that problem by evening up the load on m.g. sets in operations that use d.c. for all mining equipment.

Twelve years ago, J. H. Edwards called attention to a device originated by Sherman Melton, Sturgis, Ky., for holding a comparatively uniform power factor on an m.g. set operating on a widely fluctuating load. A separate exciter is used to supply field current to the synchronous motor. This exciter gets its excitation from the d.c. generator of the m.g. set—both shunt and series. The series excitation is adjusted to hold practically uniform power factor on the synchronous motor, by delivering fluctuating exciting current in tune with fluctuating loads on the generator. It has the added advantage of keeping the synchronous motor on the line during peak loads without excessive temperature in the motor fields.

Strip mines have attempted power-factor correction with stripping-shovel m.g. sets. They did a pretty good job until coal washeries came back into fashion. Washeries have added so much load that synchronous shovel motors usually cannot deliver enough leading rkva. to do the entire job. Modern shovels of 30 yd. and up are equipped with 0.9 power-factor syn-

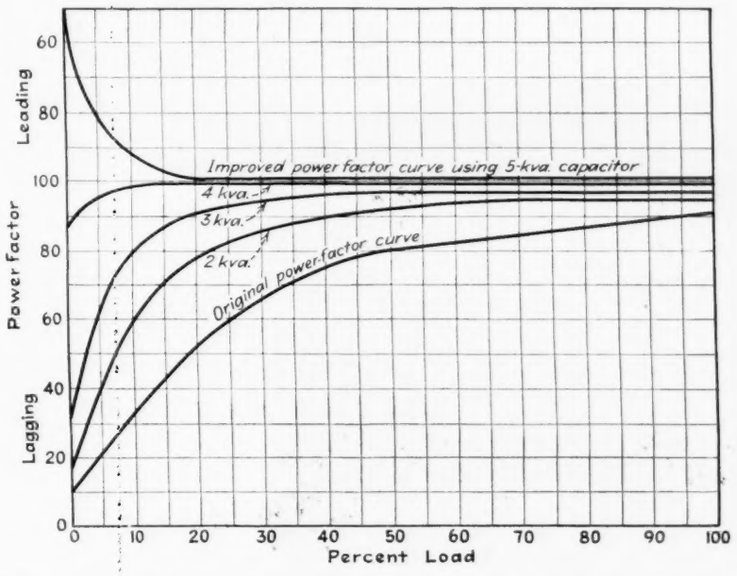


Fig. 7—Power-factor curves for 15-hp. 1,800-r.p.m. 220-volt 60-cycle induction motor operated at normal voltage.

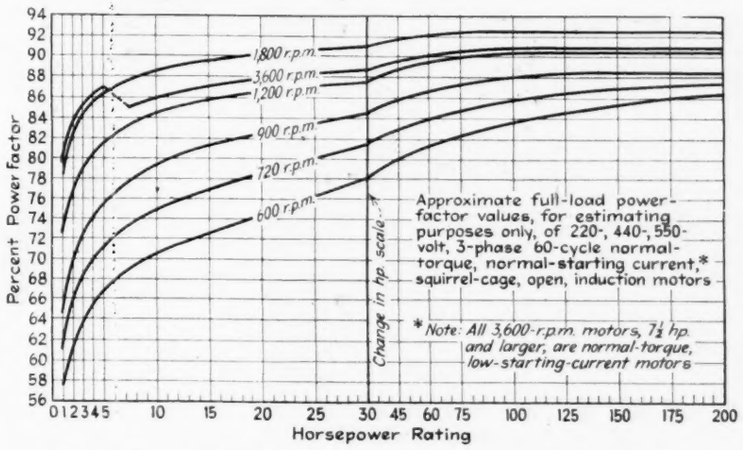
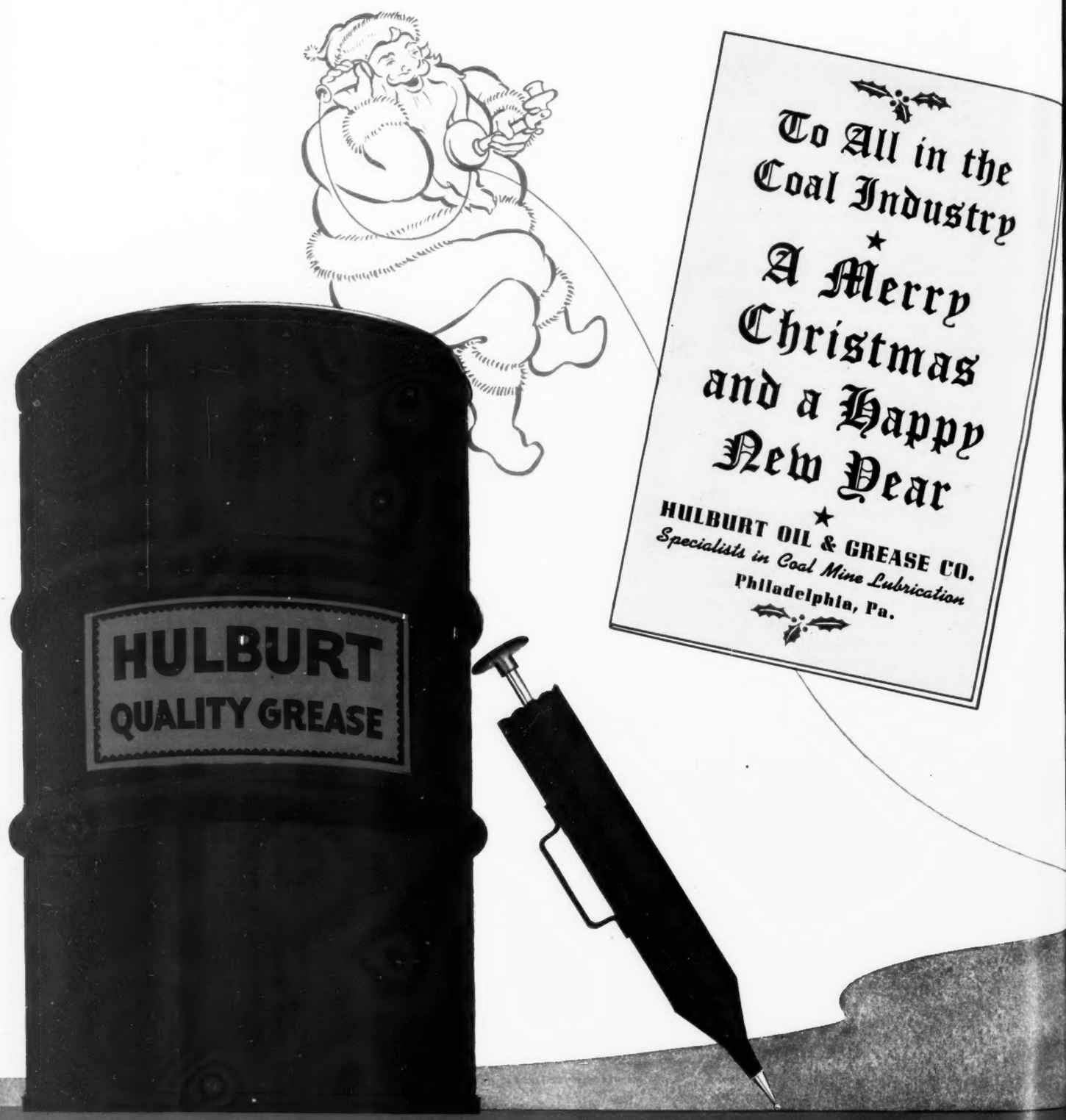

Percent Power factor
1,800 r.p.m.
3,600 r.p.m.
1,200 r.p.m.
900 r.p.m.
720 r.p.m.
600 r.p.m.
Change in hp. scale
Approximate full-load power-factor values, for estimating purposes only, of 220-, 440-, 550-volt, 3-phase 60-cycle normal-torque, normal-starting current,* squirrel-cage, open, induction motors
* Note: All 3,600-r.p.m. motors, 7½ hp. and larger, are normal-torque, low-starting-current motors
Horsepower Rating

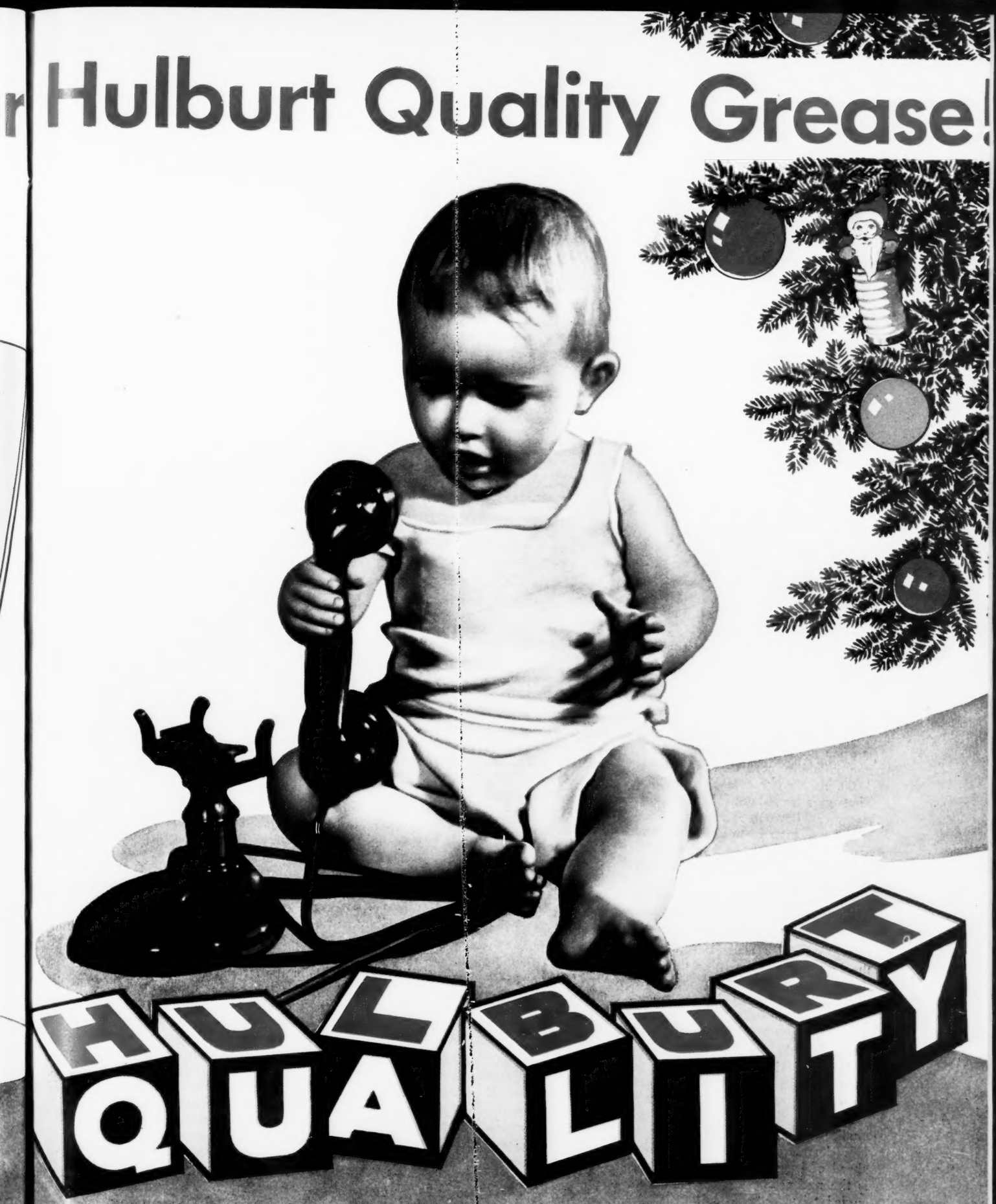
Fig. 8—Approximate full-load power factors for motors under 200 hp.

— Thanks, Santa, for H



HULBURT

r Hulburt Quality Grease!



T QUALITY GREASE

chronous motors, which have no more leading rkva. capacity than needed to correct power factor originating in the pit. There is justification for this change from 0.8 to 0.9 power-factor motors, for it is wrong in principle to use cables and pole lines to transmit magnetizing current for miles to the washery or tipple. It means heavier lines and cables, which are troublesome enough to move around at best. This observation applies to underground mines as well.

Synchronous motors have one characteristic that sometimes works against their use for power-factor correction. It often happens that power-line voltage is above normal—say 4,400 or 4,600, as compared to normal 4,000. That greatly reduces the rkva. the motor can put out. The voltage may even be so high as to absorb all that capacity—a point to be checked in any power-factor calculations involving synchronous motors.

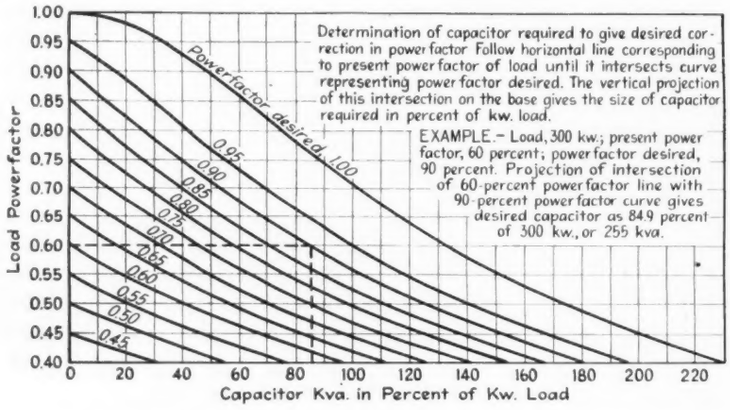

Determination of capacitor required to give desired correction in power factor Follow horizontal line corresponding to present power factor of load until it intersects curve representing power factor desired. The vertical projection of this intersection on the base gives the size of capacitor required in percent of kw. load.
EXAMPLE.– Load, 300 kw.; present power factor, 60 percent; power factor desired, 90 percent. Projection of intersection of 60-percent power factor line with 90-percent power factor curve gives desired capacitor as 84.9 percent of 300 kw., or 255 kva.
Power factor desired
1.00
0.95
0.90
0.85
0.80
0.75
0.70
0.65
0.60
0.55
0.50
0.45
Load Power factor
0 20 40 60 80 100 120 140 160 180 200 220
Capacitor Kva. in Percent of Kw. Load

Fig. 9—Curves for determining rkva. needed to raise natural power factor to desired figure.

The modern device for correcting power factor is the static condenser or capacitor. This device has some characteristics which make it very much the best yet produced for this service. Among these are: (a) no moving parts; (b) extremely high efficiency —about 99.7 per cent; (c) very rare failures—about 0.2 per cent; (d) moderate, declining cost.

Its electrical characteristics are peculiar, for the capacitor is, in several respects, a queer as well as a very appropriate device. Some of these qualities are:

1. Current output is exactly 90 deg. ahead of impressed voltage. Therein is the real reason for using a right-angled triangle to represent the circuit conditions of power-factor problems. Ninety-degree lagging current will be exactly neutralized by a like amount of 90-deg. (capacitor) leading current.

2. With definite voltage and definite frequency, a capacitor has a fixed, definite output in rkva. leading—no more, no less. Some may wonder, then, why an overload rating of 35 per cent.

3. Just this: Current output increases directly with a voltage increase. Increasing frequency also increases current output. Power circuits often run high in voltage; sometimes in frequency; hence, a margin for possible excess load is necessary.

4. The leading current output of a capacitor is independent of loads on the line and of the power factor of the load.

There is just one thing to do in solving a power-factor problem. Determine the lagging rkva. and apply that amount of leading rkva. as an offset. Since there are many factors to the problem, that may not be as easy as it looks, for costs must be balanced against results. Here are some things to consider:

1. Bad power factor cannot be corrected within the motor or other device that causes it. The current distortion within the machine is as much a necessary part of its operation as your heart is of your physical welfare. If you should destroy your heart, you would stop. If you could destroy power factor within the motor, it would stop. Synchronous motors, of course, are excepted.

2. Since bad power factor originates at the load, other things being equal, that is the point where correction should be applied.

3. Correction is made at the point where the capacitor, or synchronous motor, is connected to the line, and is effective from that point back to the source of electric power.

4. The last few points of power factor gain, as it nears 100 per cent, are the most expensive and the least effective. For that reason, and the further fact that an unstable condition may sometimes be caused at 100 per cent power factor, it is not customary to carry correction so far.

5. Some manufacturers recommend correcting individual motor applications to only 95 per cent, because, if load disappears, voltage may run abnormally high when the motor is switched off with capacitor connected.

6. When a centrally located capacitor is used for a large installation, it is sometimes advisable to split up the capacitor units so part can be disconnected during light loads. Such switching may be by hand or it may be made automatic.

Capacitor Helps Circuit

To illustrate what happens in an electric circuit when capacitors are applied to motors, Fig. 7 shows progressive results of connecting 2, 3, 4 and 5 kva. of capacitors to a 15-hp. 1,800-r.p.m 220-volt squirrel-cage motor. It will be noted that 5 kva. overdoes the correction and results in a decided leading power factor at very light load. Such a result is not normally desired.

The curves in Fig. 8 gives a close approximation of the full-load power factor of squirrel-cage motors up to 200 hp. Please note that above 5 hp., 3,600-r.p.m. motors have a lower power factor than 1,800-r.p.m. motors. Exact data on any motor may be obtained from the builder.

Fig. 9 is self-explanatory. It is a set of curves for quickly finding the rkva. needed to raise a given load from its natural power factor to any desired value. Figs. 7, 8 and 9 are reproduced with the consent of the General Electric Co.

An important item to remember is that 460-volt capacitors are about the same price as the 230-volt units, so that if 440 volts is permissible in a new installation, it is much less expensive for both control and capacitors. Auto-transformers are sometimes used to adapt 460-volt capacitors to 230-volt lines, at a saving in over-all cost. The relative price advantage of 460- over 230-volt capacitors does not hold with higher voltages, such as 2,300 and 4,000.

The final instalment will give results brought about by some installations.

FLEXIBLE DESIGN

Fitted to Prevailing Conditions Features Summerlee Refuse-Disposal Tram

The rock, bone and other impurities must be taken as they come with the coal. You can't sell the stuff and you can't give it away. But you must pay for it and get rid of it in an orderly manner or it will overwhelm you with its beginning as a shovelful and its growth into a smoking mountain around your tipple.

By J. E. HOWARD
Chief Engineer, The New River Co.

THE NEW RIVER CO., Mount Hope, W. Va., operates twelve mines in Fayette and Raleigh counties. Production is now running 4,200,000 tons annually, all from the Sewell vein of low-volatile coal in the New River field. Included in its mines are five shaft operations, of which Summerlee, 658 ft. deep, is one. This mine is believed to have been one of the first in West Virginia to install an aerial tramway for disposing of mine refuse. The New River Co.'s experience with this type of equipment has been substantial, as it now has six such units in use, representing an over-all investment of upward of $250,000.

In November, 1940, the management was suddenly confronted with the fact that a new one must be provided at Summerlee. This sudden need was unusual because installations of this kind generally come to the end of their life periods gradually as available space is filled. In this instance, however, an attempt was being made to keep an old tramway in reserve until the 1942 budget should provide a new one. Plans were under way to raise the existing track cables by an intermediate tower guyed in place on the outer end of the slate pile and thus win a life extension of about eighteen months.

Then the unexpected happened. By a miscalculation, refuse was dumped so that it fell around the base of the tail tower to considerable depth. Fire, already in the slate pile, followed the new dumpings and the front columns of the tower, under the heavy load of track-cable tension, collapsed as the hot steel softened.

The immediate emergency was met in a few hours by restoring the former larry system of disposal. This, of course, was only a temporary solution of the problem and haste in construction of a new tramway was indicated by disposal costs and other considerations.

Ground conditions, fortunately, were not a problem either as to ownership or topography, and a high mountain which once had offered an insurmountable obstacle to other plans now became a valuable asset by its presence in the exact position where it would do the most good. Running in an east-west direction, it crossed the long north-south angle between the old slate dump and the railroad empty tracks, ready to serve as tail tower for a tramway. Anchorage conditions at the terminal were soon found to offer no unusual difficulties because of the firm nature of the original, unbroken clay, in which the concrete and tension bars could be set.

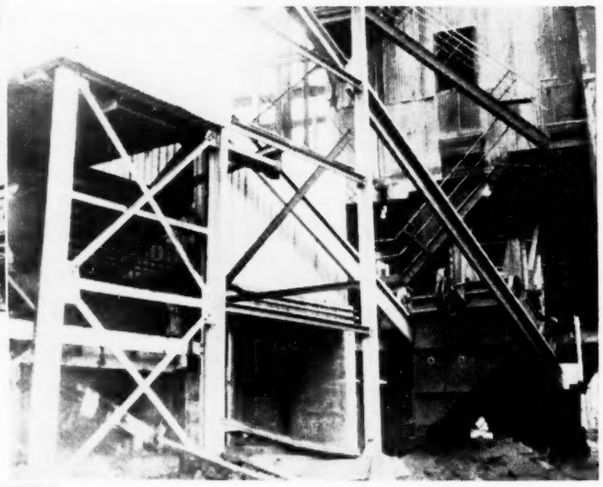
Tramway engineers were called into conference and procedures were agreed upon which would utilize existing facilities at the shaft to best advantage with a minimum of disturbance to others.

The distance from the zero point to the mountain top was found to be 2,665 ft. The vertical rise was 376.9 ft. At 600 to 800 ft. from the terminal a knoll was found for use as a breakover tower setting. This was followed by a series of slight rolls to the base of the mountain, which, in a final run of only 965 ft., rises 323 ft. to its summit. There were no interfering structures along the route, although it was necessary to take a minimum clearance alongside an air shaft. Practically, the conditions were almost made to order.

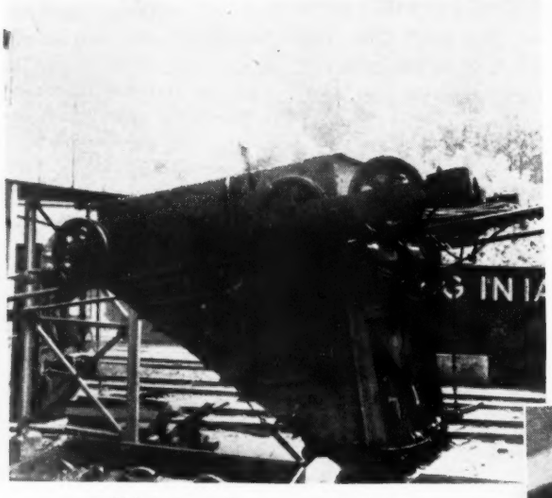
A dimensional plan of the pertinent features of the tipple was the next step. This, along with elevations, tied the zero point and directional center line of the proposed tramway in with the tipple. Special considerations were continued use of an old surge bin holding 55 mine cars of rock and the pan conveyor beneath which had to serve the larry and track while the new structure was being installed. The existing bin, although relatively small, was in good condition, and, having been built into the tipple, was, along with the conveyor, too expensive to discard for replacement equipment which itself would be costly. In addition, ground conditions were not favorable, because of lack of space, to a bin installation which would hold a day's run of rock. So it appeared more economical to combine underground storage in cars with the small bin and operate accordingly.

Next was a search of the records to ascertain the rate at which rock cars had been arriving at the shaft bottom. Sometimes they had been shunted onto sidetracks for discharge at night and sometimes they were brought out during the day but it was felt that an

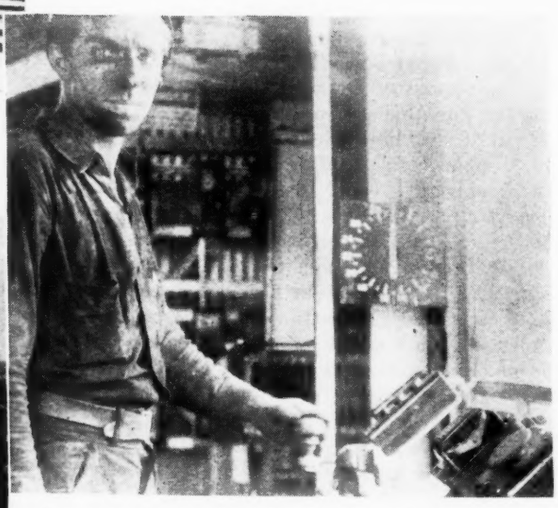
General view of terminal structure showing operator's quarters and window with hoist room at rear. Foreman Kennedy at left.



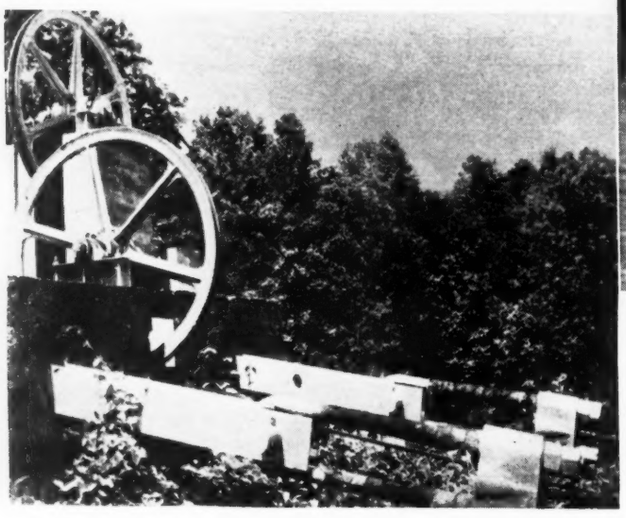
Batch loader in position at end of conveyor. Pressing a button causes it to move to upper end of track and stop automatically.



Side view of tramway bucket; level-full capacity, 125 cu.ft.



Operator Scarbro at the hoist control. The indicator shows how far the bucket is out from the terminal in feet.



Tail anchorage on mountain top showing tension bars, take-up bolts and socketed track-rope connections. In the back is one of the sheaves by which the traction rope is offset 25 ft. for return to the terminal, thus eliminating interference with bucket.

Table I—Daily Output of Coal and Rock for a One-Month Period

Day	Cars of Coal	Tons	Cars of Rock
1.....	641	1600	74
2.....	545	1356	113
3.....	553	1391	126
4.....	558	1386	48
7.....	647	1621	239
8.....	571	1412	87
9.....	548	1347	120
10.....	587	1466	118
11.....	570	1417	135
14.....	650	1609	216
15.....	708	2083	123
17.....	554	1356	105
18.....	632	1560	168
21.....	803	1979	177
23.....	763	1893	133
24.....	575	1443	115
25.....	679	1691	221
28.....	828	2065	185
29.....	577	1435	119
30.....	524	1300	120
31.....	639	1583	50
	13,162	32,993	2,792

over-all rate could be established with certainty and a fairly accurate picture developed of the hour-by-hour flow throughout the day. This would establish the principal factor to be considered in the final design which would have to take into account the size of the surge bin, avoidance of operation during periods of peak load underground and a 7-hour working shift. Cars would be loaded to hold an average of 62.5 cu.ft. of rock with an assumed weight of 85 lb. per cubic foot.

A check developed the data set forth in Table I. Daily coal loadings varied from 1,300 to 2,083 tons. The low figure probably represented a day of breakdown and the high a day where everything contributed smoothly to coal loading, with rock at a minimum. The average was 1,571 tons. Rock output varied from 50 to 239 cars—extremes which represent very special conditions. The average was 133 cars daily. The mine could be expected to produce 1,800 to 2,000 tons or more of coal per day. By proportion, this called for a tramway capacity sufficient to handle about 175 cars of rock in 6 hours. This figure would vary with the distance out, of course, and also with day to day output, but it seemed a sound basis for calculation.

With this rate of delivery set as a necessity, it could be assumed that 1,000 ft. per minute would be a normal top rate for speed of bucket travel. The distances out to the dumping space were known from the profile and acceleration, deceleration and loading of bucket would require about 0.3 minute. From this, test runs could be set up as follows:

Distance to dump, feet	1,000	1,500	2,000	2,500
Time per trip, minutes	2.3	3.3	4.3	5.3
Trips per hour..	26	18	15	11.3
Cu.ft. per hour, 125-cu.ft. loads	3,225	2,250	1,750	1,410

With these figures at hand, the main features of the tramway readily become visible. If it were to be used throughout the day there would be little storage in cars but peak power costs would result. The increased car turnover would be reflected in rock output. This would mean the displacement of equivalent cars of coal in the day's mining. Tons per day for the loader at his working face would be curtailed accordingly. Rock loadings, it appeared therefore, should be kept at a minimum on the day shift and run onto sidings. The night men should handle all rock that could be passed over by the day shift, which should devote its time to coal only, except in special cases.

Assuming dumping at a distance of 1,900 ft. out from the terminal, or well beyond the center, the rate would be 1,823 cu.ft. per hour in handling 175 cars per 6 hours of operation, leaving 1 hour for attention to the equipment. With speed of travel set at 1,000 ft. per minute, the size of the tramway bucket became 125 cu.ft. And when an additional factor, 20-year life, was added, practically all considerations affecting the tramway problem were automatically fixed for determination by the designers.

Studies of the profile and the immediate availability of a 76-ft. breakover tower (already built), plus the advantage of a 75-hp. motor for the first 10 years, as against a 100-hp. unit in a 20-year installation served to modify this immediate requirement.

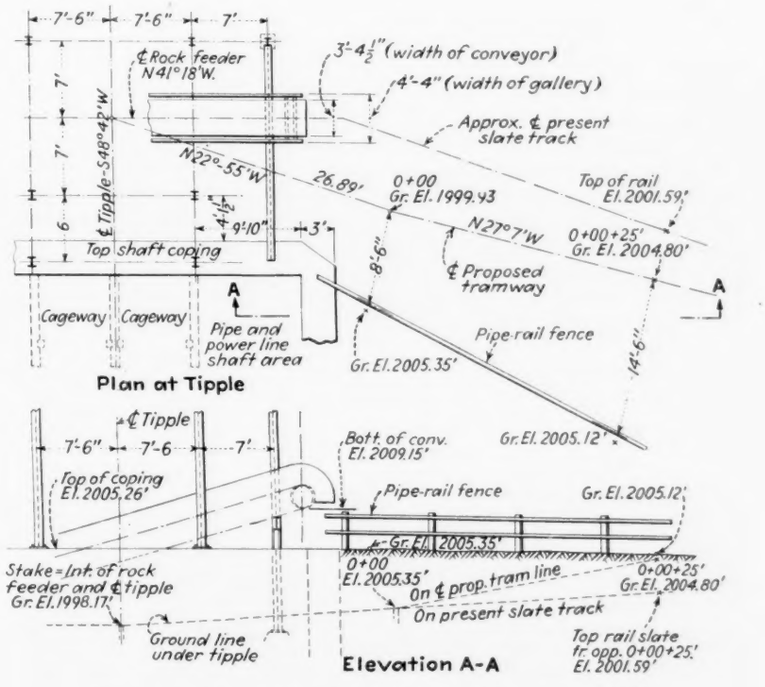


Fig. 1—Physical conditions into which the tramway was fitted.

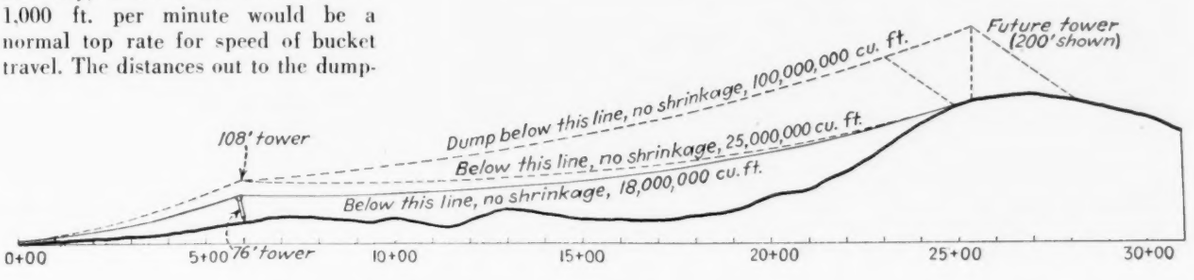


Fig. 2—Designer's study made from owner's profile.

It developed that construction could be divided into three stages. One would cover the first 10 to 12 years using the 76-ft. breakover tower and a tail anchorage near the top of the mountain. The next, involving replacing the 76-ft. tower with a 108-ft. structure, would take care of an additional 8 to 10 years. Finally, a new tail tower at 200 ft. would run the life up to more than 50 years.

To satisfy these requirements the final specifications were worked out for delivery and erection by the seller of equipment on foundations and terminal structure furnished by the owner as follows:

(a) A batch loader, Timken-equipped, should be provided to receive the refuse from the end of the existing conveyor for delivery into the tramway bucket, both having a capacity of 125 cu.ft. This batch loader would then travel up-track, elevated, about 20 ft. to its unloading position, ready for the bucket on its return. Operation would be by means of a gear-motor-driven hoist fitted with an automatic brake and limit switches so that the operator would have only to press a button to start the batch loader hoist.

(b) The bucket, 6 wheels, Timken equipped, corrosion-resisting steel, would be of 125 cu.ft. capacity, operated singly and reversible. A 76-ft. breakover tower would be set 600 ft. from the tipple with ground anchorage on the hill at 2,500 ft. The concrete footing would include bases and anchor bolts for a future tower. Two 1⅝-in. diameter locked-coil track cables on 6-ft. centers would be provided and, subject to German submarine activities, would be delivered from England where, by chance, they already were at the dock in the right size and almost the right length, awaiting a buyer. (These cables were received promptly at the building site.)

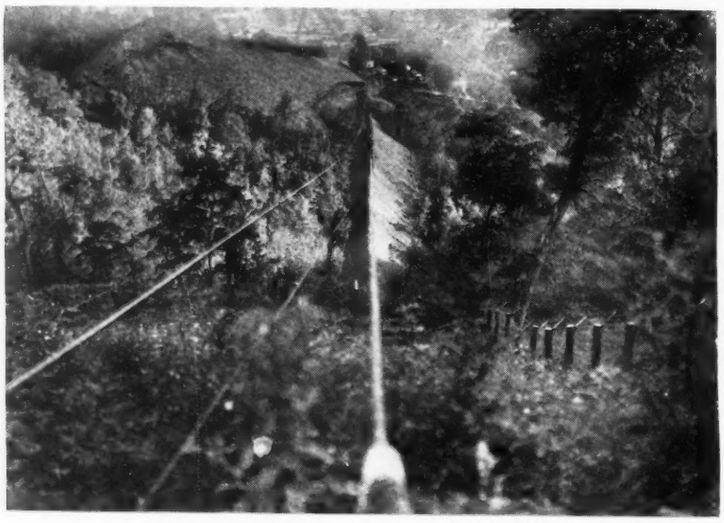
(c) Power to start the bucket at the loading terminal would be 30 hp., with a peak of 126 at the breakover tower. A 75-hp. motor already owned by New River would be suited to this work.

(d) Steel housing would be provided at the loading terminal for drive and operator. This terminal would be of steel, include rails, saddles, shields, track cables, anchor irons, etc. The drive would be a 76-in. PD grip wheel with suitable reduction to the 75-hp. motor. Equipment would include air brake, safety overspeed centrifugal switch, etc.

(e) All parts necessary to finish the breakover and tail anchorages, including track-cable sockets, take-ups at terminal and tail anchorages, along with ¾-in. traction rope and fittings, would be furnished. The breakover tower to be pin-connected at the base to allow free sway with the direction of the track ropes.

The order for the tramway was placed Nov. 29, 1940. It was put into operation May 1, 1941, having been finished in April while the mine was idle on account of the Appalachian wage negotiations. Principal causes of delay in getting a quicker operating start were winter weather, which slowed down excavation and concrete work for a few short periods, and priorities, which delayed the finishing of the grip wheel about 10 days when everything else was in readiness.

A general summary of operation follows:



Looking down from the mountain top toward the dump and tipple.

The conveyor under the surge bin fills the batch loader while the tram car is out on a trip. In case he cannot see it for himself, an electric bell informs the operator when the hopper is full and he pushes a button to move the load into position to await the incoming bucket. The batch hopper stops itself in both directions by means of limit switches and dumping into the tramway bucket is manually controlled by a lever in the operator's room.

The operator has manual drum control for moving the outgoing car, which dumps at predetermined distances. This is accomplished by use of a thread-bar and tripping mechanism which releases the door latch for front spillage of the refuse. The weight of the load opens the door and the weight of the door closes and latches it after dumping. A switch controls the hoist so that the operator cannot let it overspeed, this having application especially to the incoming bucket so that inattention will not result in its getting out of control on the steep decline. Power failure automatically puts on brakes and stops the bucket at all points regardless of the attendant.

Good Maintenance Helps

On the whole this mechanism is ready to protect itself, within reason, against careless operation as far as operating movements are concerned. But all rubbing surfaces must be kept greased and oiled. Nuts and gears must be kept tight and the signal of the electric bell responded to. Track ropes must be taken up during early operating stages (likewise the traction rope) to keep correct tension on the grip wheel. Both track ropes and especially the traction rope must be inspected regularly lest they fail suddenly. Oil must be supplied to the gravity-feed track rope oilers on the tramway bucket. Brakes and electric mechanisms must be maintained in good repair. The equipment is modern in every respect and there is no longer any pioneering in tramway construction for mine-refuse disposal, but a conscientious and mechanically minded attendant still is worth the pay necessary to retain his expert services.

In conclusion, the writer wishes to acknowledge reference to the plans, specifications and letters of the Interstate Equipment Corporation, designer and builder of the Summerlee tramway, through its engineer, Leo J. Vogel.

THE FEDERAL INSPECTION LAW AND COAL-MINE SAFETY

WITH the enactment of the federal mine-inspection law, effective May 7, 1941, direct national government participation in accident-prevention work enters a new and wider field. What that field is and how the United States Bureau of Mines is organizing to carry out its increased responsibilities and functions under that act are outlined in this Special Safety Section of the December *Coal Age*. Because of the added significance which the new statute gives to the pronouncements of the Bureau on safety questions, this section also includes the first installment of all the decisions handed down and still in effect since that board was created in 1924. To further stimulate study of accident-prevention practices, the section presents a quick analysis of the major causes of coal-mine accidents, suggestions for their prevention and an opportunity to check up on them in the form of a "Safety Quiz."

What the Law Means

By DR. R. R. SAYERS

Director, U. S. Bureau of Mines

THE Federal Coal Mine Inspection Act of May 7, 1941, broadened the scope and powers of the Bureau of Mines without giving it regulatory or police power. The act authorizes the Secretary of the Interior, acting through the Bureau of Mines, to make or cause to be made annual or necessary inspections and investigations in coal mines to obtain information relating to health and safety conditions and to determine the causes of accidents and occupational diseases originating in coal mines.

Since its creation on July 1, 1910, the Bureau of Mines has entered mines and has obtained data through the cooperation of mine management. Information was considered confidential and the names of mines and companies were not made public when details of investigations and inspections were published. The act of 1941 removes this restriction. It empowers a duly authorized representative of the Bureau to enter any coal mine the products of which regularly enter or substantially affect commerce. Refusal to admit such representative to such mines is a misdemeanor and makes the person in control subject to punishment. Companies are required, upon request, to furnish complete and correct information on any or all accidents involving bodily injury and loss of life.

The Bureau of Mines has had cordial relations with most mine owners and operators and much information has been given freely, but frequently confidential information was advisedly withheld. The situation has changed slightly. The spirit of cooperation still exists, but now the operators understand that the Bureau's representatives have authority to investigate and to inspect.

A greater opportunity is given the Bureau to render service, and the operators will benefit thereby. If an unsafe condition develops or a mine fire occurs, the Bureau probably will be called on immediately. The experience of several hundred trained engineers will be of inestimable value in

As pointed out by Dr. Sayers, director of the Bureau, this federal agency has been making mine examinations as part of its job for over thirty years. Heretofore, however, such inspections have been made intermittently and on a purely voluntary basis in so far as the mine management was concerned. Under the new law, a periodic basis is set up and the inspections carry a clear and specific legal authorization. Refusal to permit a duly qualified representative of the Bureau to enter a mine to make such an inspection is declared a misdemeanor punishable by fine not exceeding $500, imprisonment not exceeding 60 days, or both.

Despite these penalties for refusing to permit an inspection, the law gives the Bureau no power to enforce its findings. Policing power to compel changes in operating practices still rests with the State mining departments.

The only weapon given the Bureau is the powerful one of publicity. Until a few months ago doubt existed whether the Bureau had the legal right to make public its inspection findings on the examination of a specific mine. So for years, Bureau reports mentioned no actual mine in its criticisms of what seemed to it bad safety practices and embodied its recommendations in generalized terms. The first break with past policy came when the Secretary of the Interior ordered the release of Bureau reports on major-disaster investigations some time ago. Any residuum of doubt as to the right of the Bureau to publicize its findings is removed by the new law and a policy of full publicity is promised by the government.

correcting hazards and in fighting fires or performing similar duties. The annual inspections will serve to indicate unsafe conditions and suggest the adoption of additional safe practices. The cumulative effect of the inspections should be a marked reduction in accidents.

The act requires the Secretary of the Interior to report annually to the Congress the information obtained together with findings and comments and to make public reports, studies and similar educational information on progress in the prevention of accidents and occupational diseases in coal mines. This provision is the only means of enforcing recommendations. Public opinion is one of the most powerful means of enforcement of rules, regulations and suggestions. Few persons like adverse publicity, so when recommendations are made by the Federal Government they are likely to be carried out.

Federal inspectors must be competent if their opinions are to be respected. The inspectors selected are the best available. Their selection is based to a great extent on coal-mine experience; not only on the years devoted to working in coal mines but also on the quality of that experience. Before beginning to make inspections each man is given a thorough course of safety instruction based on the work developed by the Bureau of Mines. When an inspector enters a mine, the operator knows that he is an expert on coal-mine accident prevention. The recommendations will be more forceful than one man's viewpoint because after completing an inspection, conditions observed will be discussed with the district engineer and, when necessary, with the chief coal-mine inspector. The weight of this collective opinion should convince the operator that conclusions are unbiased and based on facts carefully analyzed by some of the outstanding coal-mine safety experts in the United States.

The Inspection Act means, therefore, that the mine operator will know that the carefully considered recommendations are to be made public. Following an inspection a summary report will be posted at the mine where any employee or other person having access to the mine premises may examine it. The more detailed report that follows is subject to public inspection and it will be made available to the public and will be published. Failure to comply with recommendations in this report may arouse adverse public opinion, and should a disaster occur from failure to comply with any recommendation there always will be liability to legal action. The result of such knowledge undoubtedly will be that increased effort will be expended to make mines safe, that unsafe practices will be eliminated or at least to some extent corrected, and that closer cooperation between men and management will be effected.

Federal inspectors will not work entirely alone because the act specifies that the Secretary of the Interior and the several bureaus and offices under his jurisdiction shall cooperate with the official mine inspection or safety agencies of the several States and Territories and, with the consent of the proper authorities thereof, may utilize the services of such agencies. This cooperation will be beneficial to both agencies. The lack of police powers by federal inspections may be supplemented by appropriate action by the State inspectors. Deficiencies in mining laws may prevent the enforcement of desirable changes in a mine but the force of the safety recommendations of a federal inspection may result in compliance by the operator with recommendations beyond those which are embodied in State law.

The objective of all safety organizations is prevention of accidents and improvement of health of workers. The combined efforts of local, State, and federal agencies should ultimately bring about far greater safety and health of workers in the coal mines of the United States than has been accomplished up to the present time.

How It Will Operate

ADMINISTRATION of the federal mine-inspection law is vested in the Secretary of the Interior acting through the Bureau of Mines. The act imposes on the Bureau the duty of making annual "or necessary inspections for various purposes" primarily to secure information on health and safety conditions, including the causes of accidents and ill health and to make public its findings thereon. By statute this inspection and investigation work must be done by Bureau employees who also are specifically charged with cooperation with other bureaus of the Department of the Interior and with the official mine inspection or safety agencies of the several States and territories.[1] The act also provides for the establishment of an advisory board of operators and miners. Present complexion of this advisory board appointed by Secretary of the Interior Ickes is:

Thomas Kennedy, secretary-treasurer, United Mine Workers of America; Capt. Percy Tetlow, industrial representative, United Mine Workers; John T. Jones, director, Labor's Non-Partisan League; Cadwallader Evans Jr., vice president and general manager, Hudson Coal Co.; L. C. Campbell, general manager, Koppers Coal Co., and T. J. Thomas, president, Valier Coal Co.

Mine inspectors, according to the law, must have at least five years' practical experience in coal mining and be recognized by the Bureau "as having the training or experience of a practical mining engineer in those essentials for competent coal-mine inspection."[1]

[1] Address of J. J. Forbes before West Virginia Coal Mining Institute, Nov. 7, 1941.

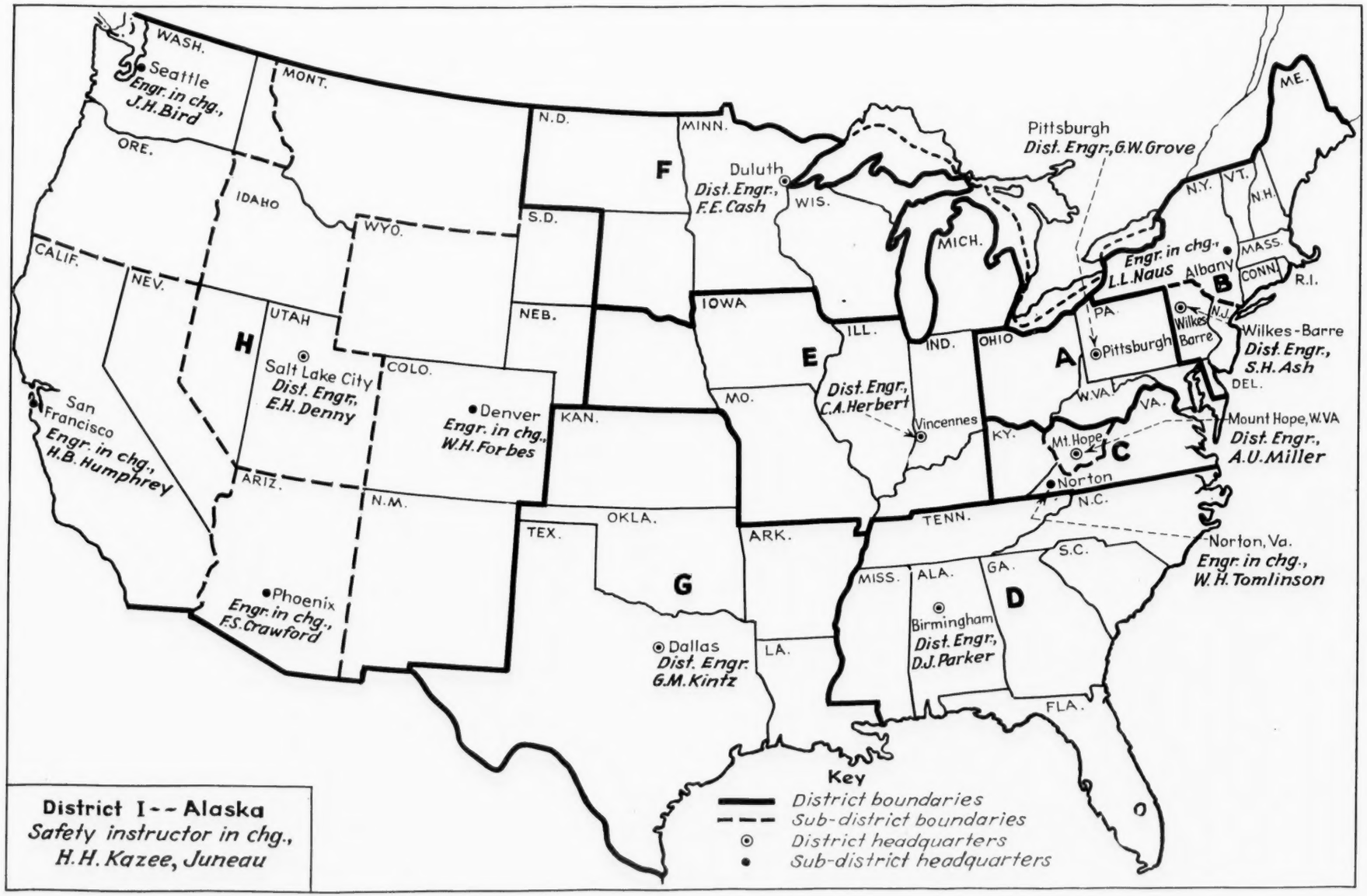
For purposes of administering the law, the Bureau has established a Coal-Mine Inspection Division with J. J. Forbes as chief engineer. The Mine-Inspection Division will be part of the Bureau's Health and Safety Branch heading up under Dan Harrington. Present plans call for the appointment of 107 mine inspectors distributed among the districts of the Safety Division (see map on p. 65). The district engineer in each district will be the key man in the organizational set-up and all work in connection with the mine inspections will flow through his office.

There will be four grades of coal-mine inspectors with entrance salaries ranging from $2,600 to $4,600 per annum.

The 107 inspectors—which probably will be increased to 250 or more when the work really gets under full swing—will include:

15 senior inspectors at $4,600 per annum.

33 coal-mine inspectors at $3,800.



Federal Mine-Inspection Districts

33 associate coal-mine inspectors at $3,200.

26 assistant coal-mine inspectors at $2,600.

In addition, it is also hoped to add five mining engineers, five electrical engineers and five mining-explosives engineers, with ventilation engineers in the offing. The goal, of course, is to set up such a staff of specialists to pass on the reports of the individual inspectors that the document finally submitted to management will give the operator the benefit of the combined expert judgment of the whole group.

Up to Oct. 1, approximately 1,450 applications for these positions had been graded by the U. S. Civil Service Commission and 900 classed as eligible for appointment. Applications were received from 29 States and Alaska, of which 51 per cent came from Pennsylvania and 11.5 per cent from West Virginia. The immediate objective of the division is early examination of the 2,500 mines employing more than 25 persons each.

To be eligible for appointment as a senior inspector under the civil-service qualifications, which are more stringent than those set forth in the law, the candidate must have had ten years of "broad and progressive practical experience in work connected largely with safety-of-operation . . . including at least four years of very difficult, important and responsible specialized work in some supervisory capacity such as mine superintendent, foreman, mining or safety engineer." Coal-mine inspectors must have had nine years of such experience, three years in a supervisory capacity; associate mine inspectors, seven years including two in a supervisory capacity; assistant coal mine inspectors, five years with two in a supervisory capacity.

After the inspectors are appointed, they go to Pittsburgh for six to eight weeks of intensive training. During this period, they become familiar with Bureau safety policies and are given courses in mine inspection, accident prevention, mine-rescue work and first-aid, and are impressed with the idea that their job is to serve the industry. The first group started training Nov. 17, and a second will begin the course about Jan. 5. First official inspections under the law were made Dec. 4.

The inspection act contains numerous provisions regarding dissemination of information on conditions disclosed by the inspections. It is proposed, therefore, to prepare and disseminate, both in summary and detailed form, informative material based on inspection reports. In many instances involving small mining properties, a number of reports may be condensed and handled in single statements. Where larger properties are concerned, it will be necessary to prepare detailed reports, which will be available to the press, miners' and operators' organizations, insurance companies, State and federal agencies, and other interested parties. In addition to preparing such summaries of reports, material will be released from time to time on the general progress, organization and problems of the inspection program, including Bureau findings on related problems.

NEED A NEW SAFETY SLANT?

LIKE QUIZ programs on the air, examinations you can give yourself to find out how you think, feel and act are all the rage at the moment. So we offer management, operating officials, and foremen and assistants another on the subject of safety. The questions were selected with the idea of reflecting some of the major trends in the safety field, although it goes without saying that others even more pertinent doubtless could be asked. But perhaps these can give you a new slant on your ever-present problem. So with that in mind, you are invited to have a go at them.

Management

1. Does your accounting system show injury cost?....Yes....No....

2. Is your injury cost higher or lower than that of other mines in your field?.....Yes....No....

3. Do you know how much it costs to take care of damage to plant and equipment resulting from accidents, whether or not they cause injuries to persons? .....Yes....No....

4. Have you made it clear to your operating staff and employees that safety is the first consideration at all times? .....Yes....No....

5. Have you set up a system for keeping operating officials and employees continually aware of your stand on safety (personal visits, letters, company safety publications or similar measures)?...Yes....No....

6. Have you a full-time safety department or director? Yes....No....

7. Does your safety department or director have enough authority to insure that safety regulations are not set aside for coal?....Yes....No....

8. Do you encourage suggestions for promoting safety from your operating and safety staffs *and mine employees?* .....Yes....No....

9. Have you established a system for carefully reviewing such safety suggestions and putting them into effect when approved, giving due credit?..... Yes..... No....

10. Does your safety program provide for the cooperation of employees and their families?...Yes....No....

11. Are you set up to keep your employees and their families regularly informed about injuries which occur and their causes?....Yes....No....

12. Do you know if your plant and equipment are in condition to pass with a good rating a test based on accepted safety standards of the present day?.....Yes....No....

13. Do you know if your operating practices are in accord with accepted safety standards?....Yes....No....

14. Have you adopted accepted measures for preventing mine explosions, such as ample positive ventilation *to the working face*, permissible equipment and explosives, sprinkling, other methods of keeping down dust, rock-dusting, etc?.....Yes....No....

15. Do your employees get regular

first-aid training?....Yes....No....

16. Are your employees given any training in how to do their jobs properly and safely?.....Yes....No....

17. Are both new and old employees checked from time to time to see if they fit into their jobs and are not developing unsafe and inefficient working habits?.....Yes....No....

18. Do you employ enough bosses so that none have so many other duties as to be unable to observe safety standards? ..... Yes..... No.....

19. Are all foremen, assistants and other employees, as necessary, supplied with gas-detection equipment, first-aid material and other safety equipment? .....Yes....No....

20. Are all accepted types of protective clothing worn by all men on the job?.....Yes....No....

Superintendents—Other Operating Officials

1. Do you know the answers to Questions 2 and 3 in the "Management" list?.....Yes....No....

2. Do you regularly check or ask reports on the condition of your plant and equipment?.....Yes....No....

3. Do you constantly check methods and practices at your mine to make sure they are safe, keeping in mind that safe working methods are the most efficient?.....Yes....No....

4. Have you set up a systematic timbering plan?.....Yes....No....

5. Do you fully avail yourself of the safety help offered by your own safety department or director, State and federal agencies, insurance companies and others?...Yes....No....

6. Do you encourage bosses and men to watch for hazards and unsafe practices and submit preventive recommendations? .....Yes....No....

7. Do you meet regularly with your bosses on safety?....Yes....No....

8. Have you assisted your employees in organizing to promote safety (Holmes safety chapter or similar safety organizations)? Yes....No....

9. Do you assist employees in holding safety meetings and attend at all times? .....Yes....No....

10. Do you sponsor first-aid and rescue training?.....Yes....No....

11. Do you make sure your bosses and employees are kept up to date on safety regulations and other safety developments? .....Yes....No....

12. Do you regularly see that bosses and employees have data on injuries that have occurred and how they can

be prevented?.....Yes....No....

13. Do you have some method of singling out for credit or reward bosses and men with good safety records? .....Yes....No....

14. Do you personally check (or have it done) the qualifications of new employees and try to give them the right start from the safety standpoint? .....Yes....No....

15. Is provision made for following up new men?.....Yes....No....

16. Do all your men wear hard hats, safety shoes and other protective clothing? .....Yes....No....

17. Does your ventilating system provide plenty of air clear to the face all the time?.....Yes....No....

18. Do you rock-dust, sprinkle and take other accepted precautions against explosions?...Yes....No....

19. Have you set up a system which insures reporting all injuries—even minor ones?.....Yes....No....

20. Have you taken proper steps for handling injuries which may occur, including a dispensary or emergency hospital; plenty of first-aid material in working sections; ambulance cars or other means of transporting injured men, etc.?.....Yes....No....

Foremen and Assistants

1. Does your mine or section regularly get a good rating in the inspection reports?.....Yes....No....

2. Do you keep up with company regulations and the mine law to insure that they are observed in your mine or section?.....Yes....No....

3. Do you get and study injury reports from other mines or sections so that you can protect your men against those hazards?.....Yes....No....

4. Do you try to have some safety suggestion or message to pass on to your men every day? Yes....No....

5. Do you stay with new men long enough to make sure they are in the right jobs, know how to do them and will work safely? ....Yes....No....

6. Do you keep track of all your men to make sure they remain fitted to their jobs and are not developing unsafe habits?...Yes....No....

7. Have you studied your men's jobs to see if they can be done more efficiently and safely?...Yes....No....

8. Do you encourage safety suggestions? .....Yes....No....

9. Do you try to stimulate interest in first-aid training and take part yourself? .....Yes....No....

10. Do you try to stimulate interest in any employee safety organization and also take part?...Yes....No....

11. Are all your men wearing the required safety clothing and using all the other equipment specified for safety? .....Yes....No....

12. Is it the rule in your mine or section that defective machinery shall not be used and work shall not be done in any place which becomes unsafe? .....Yes....No....

13. Do you regularly check the condition of track, wire, machinery and other facilities under your jurisdiction to forestall development of dangerous conditions?...Yes....No....

14. Can you say that clearance regulations are strictly observed in your mine or section?.....Yes....No....

15. Does your mine or section have in it, now, all the trolley and machinery guards, doors, brattices, sprinkler outlets, fire extinguishers and other safeguards required by the company and the law?...Yes....No....

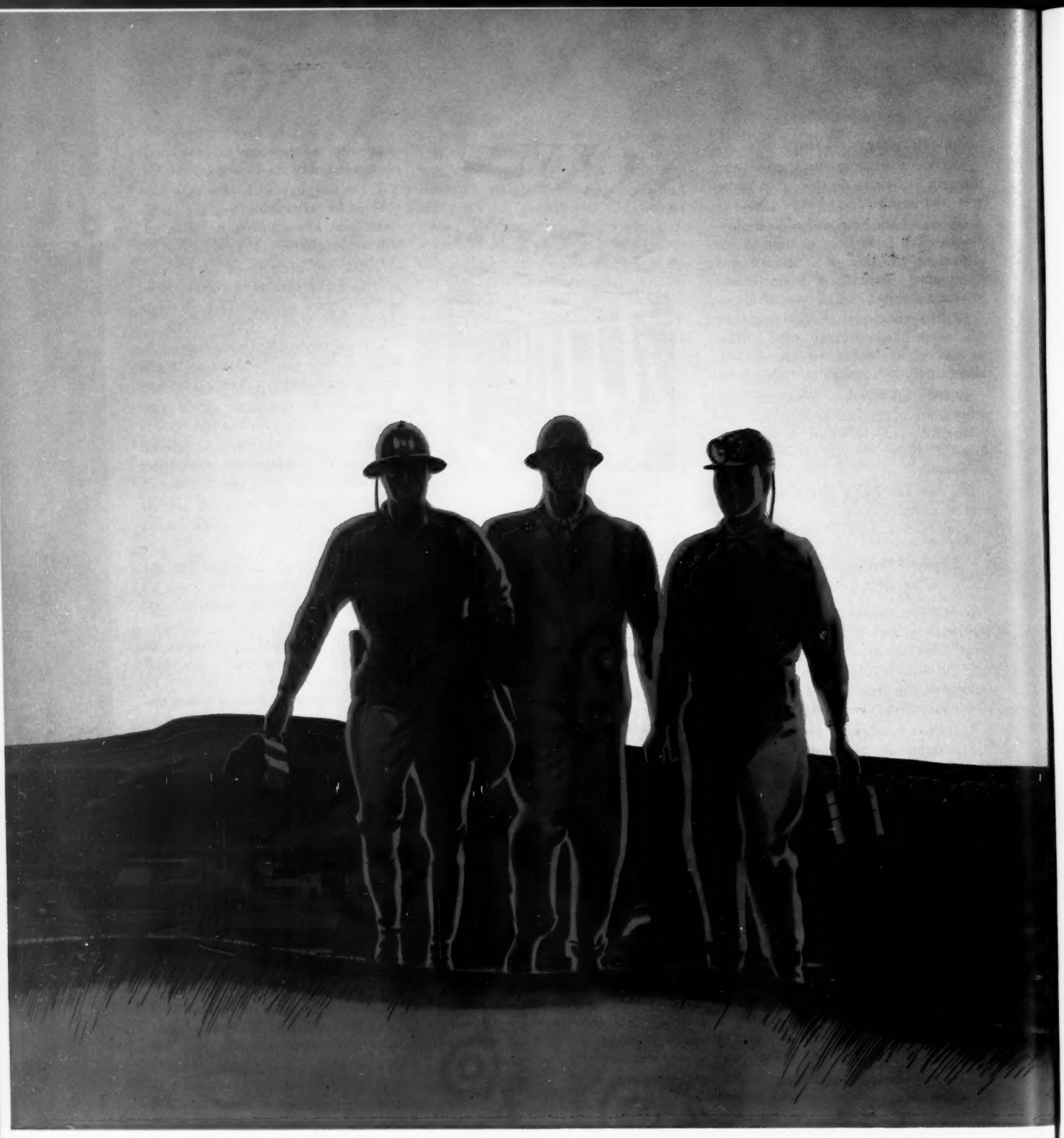
16. Does your mine or section have in it, now, sufficient timber, lumber, canvas and other supplies for use when needed?.....Yes....No....

17. Do you regularly check tools in your mine or section to see if they are sufficient in quantity, right in type and safe?.....Yes....No....

18. Do you observe strictly requirements as to safety posts and bars, minimum quantity of timbering, timbering methods, etc.? Yes....No....

19. Do you know definitely how much air is reaching the face of every working place in the mine or section you supervise?.....Yes....No....

20. Does your mine or section have in it, now, all the first-aid material necessary for treating any injury that might occur?.....Yes....No....



LOOKING FORWARD WITH SAFETY

This Company, with the foremost research facilities in the industry, looks to the coming years as a continual renewal of the old challenge of mining hazards . . . the challenge that gave us being, and the acceptance of which has accounted for our notable development.

There will be new work-ways for the American miner to traverse, and altered hazards to encounter —but we know that with the ever-closer cooperation of the mining industry and the many organizations for promoting better safety, these future problems will be solved as surely as those of the past.

Our research and products are dedicated to the task. You may be sure of our faith and skill.

MINE SAFETY APPLIANCES COMPANY
Braddock, Thomas and Meade Streets
Pittsburgh, Pa.
District Representatives in Principal Cities

SIGNPOSTS TO SAFETY SET UP BY BOARD DECISIONS

TO PROMOTE safety in mines by reducing differences of opinion and obtaining generally acceptable decisions on problems of a more or less complicated nature which might arise, a Mine Safety Board was established in the U. S. Bureau of Mines June 1, 1924. Its purpose was "to consider questions arising within any divisions of the Bureau that require a definition of the Bureau's collective opinion as to safety practices, safety devices or safety methods for underground operations or open-pit mining. . . . The approved decisions shall form the basis of teaching and policy for the Bureau."

THE SCOPE of the board's activities was increased by an order effective Oct. 1, 1936, providing that "it shall consider questions referred to it by the director of the U. S. Bureau of Mines or branch chiefs that require definition of the Bureau's collective opinion as to safety practices, safety devices, safety methods and related matters pertaining to health and safety. It shall make formal minutes of its decisions and report them to the director for approval or disapproval. The approved decisions shall form the basis of teaching and policy for the Bureau."

SINCE its organization, the board has handed down 33 decisions, two superseding earlier rulings. These decisions cover a wide variety of safety questions involving both mining practices and equipment. Part of these decisions, with the titles condensed in some instances, are reported in the following pages. he remainder will appear in the next issue. The decisions were taken from Information Circulars 6946, 7002, 7018, 7050, 7078, 7109 and 7153, which also include explanatory matter applying to each ruling.

Decision 1—Miners' Lamps. May 26, 1926

The U. S. Bureau of Mines recommends that:

1. In all coal mines the portable lamps for illumination be permissible, portable, electric mine lamps; and also

2. In places where firedamp or blackdamp is likely to be encountered, a permissible, magnetically locked, flame safety lamp for gas detection, or equivalent permissible device, be supplied to at least one experienced employee in each such place; and

3. Any employee before being supplied with a permissible flame safety lamp be examined by a competent official of the mine to assure the man's ability to detect gas; and

4. All coal mines, whether classed as nongassy or gassy in any part, be supplied with magnetically locked, permissible, flame safety lamps, properly maintained and in sufficient number for all inspection purposes.

Decision 2—Explosive Types and Use. May 8, 1926

In the interest of safety the U. S. Bureau of Mines recommends that for blasting in coal mines, permissible explosives, fired electrically, be exclusively used; and that, as an aid to blasting, all coal which is feasible to cut should be cut or sheared.

Decision 3—Superseded by Decision 33.

Decision 4—Auxiliary Fans or Blowers; Coursing of Air. Jan. 17, 1927.

In the interest of safety, the U. S. Bureau of Mines recommends that auxiliary fans or blowers should not be used in coal mines as a substitute for methods of regular and continuous coursing of the air to every face of the mine.

Decision 5—Superseded by Decision 32.

Decision 6—Sealing. April 26, 1927.

In the interest of safety, the U. S. Bureau of Mines recommends that in coal mines all entries, rooms, panels, or sections that cannot be kept well ventilated throughout or cannot be inspected regularly and thoroughly, or that are not being used for coursing the air, travel, haulage, or the extraction of coal, be sealed by strong fireproof stoppings.

Decision 7—Separate Intakes and Returns. Nov. 7, 1927.

In the interest of safety, the U. S. Bureau of Mines recommends:

1. That the main intake and main return air currents in mines be in separate shafts, slopes, or drifts.

2. That the main intake shaft lining be of fireproof construction and there be a minimum amount of inflammable material in or adjacent to the shaft.

Decision 8—Ventilation Definitions. Feb. 6, 1928.

The U. S. Bureau of Mines recommends that in mine ventilation the following definitions be used:

1. The term "intake air" and the term "return air" without qualifying adjectives shall be used only to define mechanical movement of the air respectively in an inward or outward direction with reference to the mine as a whole or to any one group of workings.

2. When health and safety are concerned, the term "pure intake air" shall mean:

(a) Air which has not passed through or by any active workings, and/or

(b) Air which has not passed through or by any inactive workings, unless these are effectively sealed, and

(c) Air which is free from poisonous gas and by analysis contains not less than 20 per cent oxygen (dry basis) and not over 0.05 per cent of inflammable gas.

Decision 9—Quantity and Quality of Air. Feb. 13, 1928.

The U. S. Bureau of Mines recommends in coal-mine ventilation practice the following specifications as to unit quantity and quality of air:

1. The quantity in cubic feet of pure intake air flowing per minute in any ventilating split shall be at least equal to 100 times the number of men in that split.

2. The quantity of air entering such unsealed place shall be at least 200 cu.ft. per minute and as much more as may be necessary properly to dilute and carry away inflammable or harmful gases which may be present.

3. The air shall be made to circulate continuously to the face in every unsealed place into which an appreciable amount of methane enters.

4. The air in any unsealed place shall be considered unfit for men if it shall be found to contain less than 19 per cent oxygen (dry basis), more than 1 per cent carbon dioxide, or a harmful amount of poisonous gas.

5. If the air in any unsealed place, when sampled or tested in any part of that place not nearer than 4 ft. from the face and 10 in. from the roof, shall be found to contain:

(a) More than 1½ per cent of inflammable gas, the place shall be considered to be in hazardous condition and require improved ventilation, and

(b) If more than 2½ per cent of inflammable gas is found, the place shall be considered dangerous, and only men who have been officially designated to improve the ventilation and are properly protected shall remain in or enter said place.

6. If the air in the split which ventilates any group of workings contains more than 1½ per cent of inflammable gas, these workings shall be considered to be in a dangerous condition, and only men who have been officially designated to improve the ventilation and are properly protected shall remain in or enter said workings.

Decision 10—Providing Escapeways. Aug. 19, 1928

The U. S. Bureau of Mines, in the interest of safety in all underground mines, recommends that:

1. Every underground mine shall have two or more ways of escape to the surface, so arranged and equipped that men can escape quickly.

2. Such ways of escape shall be so separated by at least 50 ft. of natural ground throughout their length that damage to one from any source shall not thereby lessen the effectiveness of the other as a means of escape.

3. (a) Where the way of escape is a shaft which is steeper than 45 deg. from the horizontal, it shall have incombustible walls or lining and contain no fire hazard from the surface to the lowest level.

(b) Where the way of escape is a drift or slope which is inclined less than 45 deg. from the horizontal, the incombustible walls, or lining, and freedom from fire hazard shall extend at least 200 ft. from the entrance.

4. Where but one way of escape has incombustible walls or lining, it shall be the normal intake airway.

5. Not more than ten men shall be employed in any part of a mine on any one shift until a second way of escape from that part has been provided.

Decision 11—Haulage and Hoisting on Intake. May 1, 1929.

In the interest of safety, the U. S. Bureau of Mines recommends that in coal mines, haulage and/or hoisting be kept in intake air as far as possible.

Decision 12—Shotfiring Methods. Feb. 8, 1930.

The U. S. Bureau of Mines, extending Mine Safety Decision 2, recommends that for blasting either coal or rock in coal mines, "permissible"[1] explosives or equivalent permissible device be used exclusively, and in addition recommends that in blasting[2]:

1. Each charge shall be in a hole properly drilled and stemmed with incombustible material.

2. Each shot shall be fired separately by a permissible single-shot blasting unit, using an electric detonator or igniting equivalent of a kind specified by the Bureau for the particular "permissible" explosive or permissible blasting device.

3. Before and following each shot in gassy and slightly gassy coal mines, examination for gas shall be made with "permissible" flame safety lamp or permissible equivalent,[3] and

4. If more than 1½ per cent of inflammable gas is found in the quantity and by the method specified in Mine Safety Decision 9,[4] the place shall be considered to be in a hazardous condition, and before another shot is fired the gas shall be reduced by ventilation below the percentage and quantity specified in Decision 9.

5. Each shot employing explosives shall be prepared and fired by or under the immediate supervision of a man having a State certificate as a mine examiner, fireboss, or foreman; and, whenever conditions permit, all other men than those authorized to prepare and fire shots shall be out of the mine when shotfiring with explosives is being done.

Decision 13—Electrical Equipment in Mines That May Become Gassy. Feb 8, 1930.

The U. S. Bureau of Mines recommends that when electricity is used in coal mines rated as gassy,[5] or whenever in any mine the atmosphere may become gassy

1. Electrical equipment shall be permissible.[6]

2. Nonpermissible electrical equipment[7] shall be used only in pure intake air,[8]

---

[1] Any explosive or device that has successfully passed scheduled tests and is officially approved by the U. S. Bureau of Mines is termed "permissible."

[2] Exception: This rule would not apply where shotfiring is done electrically from the surface when all the men are out of the mine.

[3] Mine Safety Decision 1 relative to "permissible" flame safety lamps or equivalent.

[4] Decision 9, paragraph 5: "If the air of any unsealed place when sampled or tested in any part of that place not nearer than 4 ft. from the face and 10 in. from the roof shall be found to contain:
(a) More than 1½ per cent of inflammable gas, the place shall be considered in a hazardous condition and require improved ventilation and
(b) If more than 2½ per cent of inflammable gas, the place shall be considered dangerous, and only men who have been officially designated to improve the ventilation and are properly protected shall remain in or enter said place."

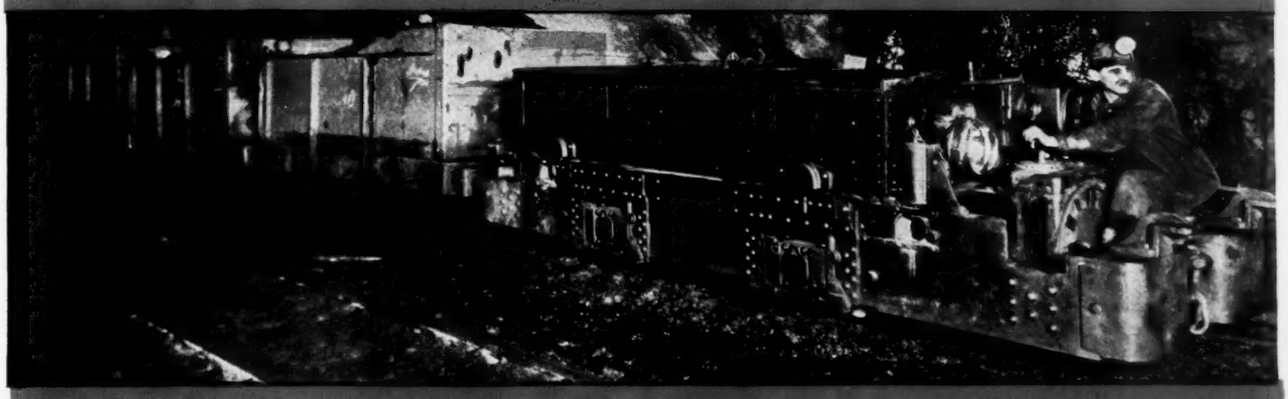
[5] Decision 3 classifies coal mines on the basis of the specific amounts of methane found in the mine atmosphere. See, also, Decision 9.

[6] Anything that has successfully passed scheduled tests and is officially approved by the U. S. Bureau of Mines is termed "permissible."

[7] Including trolley wires, trailing cable connections other than through permissible junction boxes, and power lines (except armored rubber-covered cables which meet the specifications of the National Electrical Code).

[8] Decision 8 defines "pure intake air."

NO PRICE TOO HIGH



FOR SAFETY

APPARENT ECONOMIES effected at the cost of lessened safety immediately vanish when accident adds its own high price to the original cost. A mine explosion or fire can cost so much in life and property that SAFETY must always be considered an integral part of the price of equipment.

In comparing relative merits of various types of haulage equipment, the maximum safety offered by the type propelled by storage battery is a factor no one can afford to overlook. Mine locomotives and rubber-tired haulage equipment propelled by Exide-Ironclad Batteries bear the approval of the Bureau of Mines. Exide-Ironclads are widely used, in excessively gassy mines, under the most hazardous conditions.

When haulage equipment is powered by Exide-Ironclads, to the advantage of utmost safety is added the advantage of economical operation. The high power ability and sustained voltage of Exide-Ironclads enable you to handle heavier loads, at faster speeds—with increased production per day. The greater safety thus obtained is enjoyed at low haulage cost. Write for booklet, "The Storage Battery Locomotive for Underground Haulage."

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THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia
The World's Largest Manufacturers of Storage Batteries for Every Purpose
Exide Batteries of Canada, Limited, Toronto

3. Electrical power shall be cut off whenever the air in the workings is in a dangerous condition[9] due to inflammable gas.

Decision 14—Clearance, Shelter Holes, Location of Trolley and Cables. April 21, 1930.

In the interest of safety in coal mining,[10] the U. S. Bureau of Mines recommends:

1. That in all haulageways there shall be a continuous space for travel on at least one side of the trackway, with a clearance of 30 or more inches from the nearest obstruction to the farthest projection of any moving equipment.
2. That any electric conductors other than armored cables, telephone, and low-voltage signal wires shall be placed on the opposite side of the haulageway from the traveling space.
3. That in all haulageways there shall be holes that may be used for shelter, suitably marked, unobstructed, and not over 60 ft. apart on the traveling side, not less than 3 ft. deep, 5 ft. wide, and 6 ft. in height or as high as the traveling space if that is less than 6 ft. in height.
4. That at sidings of haulageways the tracks shall be so placed that there will be a space between them free from obstruction, at least 3 ft. wide between the farthest projections of equipment moving or standing on the two tracks, and where necessary, because of conditions of roof support, this space may be regarded as a substitute for the traveling space, as provided in the preceding sections.
5. The provision of traveling space shall be as in (1) wherever practicable; otherwise, the speed of haulage shall be limited to 3 m.p.h.

Decision 15—Wetting Cuttings and Cars. July 23, 1930.

In the interest of safety in coal mining, the U. S. Bureau of Mines, to lessen the coal-dust explosion hazard, recommends that:

1. Machine coal cuttings be wetted as the cutting is being done.
2. The coal face, and the working place 40 ft. therefrom, shall be kept free of coal dust by the use of water.
3. The tops of loaded cars in the working place shall be wetted.

Decision 16—Removal of Machine Cuttings. July 23, 1930.

In the interest of safety in coal mining, the U. S. Bureau of Mines recommends that:

1. Machine cuttings be removed from the cut.
2. If the machine cuttings are of a character which would contribute to a dust explosion, they shall be sent out of the mine.

Decision 17—Reducing Dust in Haulageways. Dec. 20, 1930.

To lessen the formation and distribution of coal dust in haulageways, the U. S. Bureau of Mines recommends that in bituminous and sub-bituminous mines

1. The mine cars should be constructed and maintained dust-tight.
2. The coal should be so loaded that it will not shake off in haulage.
3. The cars and loads should be so sprayed as to prevent dust being distributed along the haulageways.

Decision 18—Certificates of Competency. Jan. 18, 1932.

In the interest of safety in coal mining, the U. S. Bureau of Mines recommends that:

1. The foreman regularly in charge of underground operations and also any person who, in the absence of the foreman, may be placed in temporary charge, should each have a certificate of competency from the State to act as mine foreman.
2. The superintendent or person in responsible charge of the mine, to whom the mine foreman reports, should have a certificate of competency from the State, which should be issued upon a showing of underground experience for a period of time as long as that required for a foreman's certificate and upon passing an examination including all technical questions asked for in the examination required of foremen.[11]
3. These certificates should expire after some stated period of time, such as five years, and should be renewed only after the applicant has again passed the examination required by the State.

Decision 19—Internal-Combustion Engines for Mine Haulage. Jan. 20, 1932.

In the interest of safety, the U. S. Bureau of Mines recommends that:

1. Internal-combustion engines should not be used in any parts of mines and also should not be used in tunnels under construction because of the hazard of carbon monoxide in the exhaust gases, except

(a) When the air current is more than 100 linear feet per minute and the toxic gases are always less than 0.02 per cent in the air current.

(b) When the percentage of inflammable gas in the air current is less than 0.25 per cent and/or inflammable gas cannot be detected in any place by a permissible flame safety lamp.

2. Gasoline or other highly inflammable liquids should not be used for engine fuel in mines and in tunnels under construction because of the hazard of their transportation and use.

Decision 20—Ventilation in Driving and Operating, Tunnels, Drifts, Slopes and Shafts. Sept. 8, 1932.

In the interest of safety in underground mining, the U. S. Bureau of Mines recommends that:

While driving tunnels or drifts and sinking or raising shafts or slopes, and also in their operation, there should be an adequate ventilating current[12] wherever men work or travel.

[9] Decision 9 defines the proportion or amount of gas in a mine working which shall be considered dangerous.

[10] The provisions in the above decisions are in general also applicable and advisable in metal and nonmetal mines.

[11] Requirements for foremen's certificates will cover this provision.

[12] For definition of an "adequate ventilating current" see Mine Safety Board Recommendatory Decision 9.

The remaining 13 decisions, crowded out of this issue because of lack of space, will be published in the January, 1942, number.

ROCKBESTOS A.V.C.
MINING CABLE
PREVENTS WIRE-FIRES

because felted asbestos insulation provides protection against conductor-heating overloads and copper-melting arcs.

because felted asbestos walls seal the varnished cambric high dielectric insert from heat and short-circuit fires.

because felted asbestos acts as a fireproof barrier against travelling wire-fires by preventing their spread.

because the rugged asbestos braid will not burn or transmit flame and is resistant to oil, grease and moisture.

For information refer to McGraw-Hill Coal Mining Catalogs or write to Rockbestos Products Corporation, P. O. Drawer 1102, New Haven, Conn.

Order from these jobbers—Specify "Rockbestos A.V.C."

BECKLEY, W. VA.:	Beckley Mach. & Elec. Co.	HUNTINGTON, W. VA.:	Banks-Miller Supply Co.
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ROCKBESTOS A.V.C.—*the wire with permanent insulation*

BIG COAL-MINING HAZARDS
Falls of Roof and Coal

Tons per Fatality

1939 — 715,865

1940 — 807,567

Lynch Coal Operators' Reciprocal Assn.

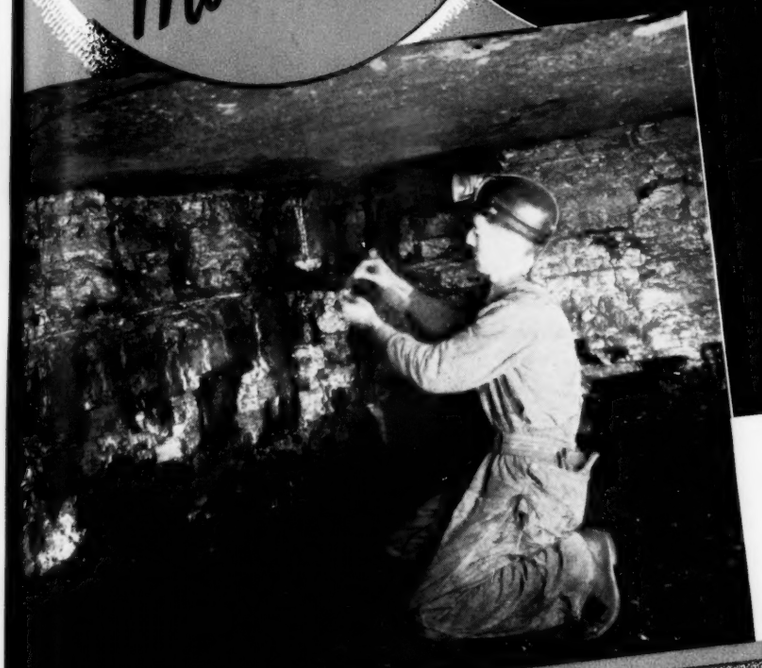
How to Prevent Them

- Careful training of supervisors and miners in the sounding of roof, face and rib and in the detection of their defects.
- Frequent and thorough inspection and sounding of roof, face and ribs, by means of the vibration method in which the rock or coal is struck a sharp blow with a testing stick or rod while the fingers of one hand rest lightly on the material being tested to feel the vibration of loose material.
- Elimination of overhanging brows on ribs and faces by correct placing of drillholes and by trimming such overhangs when they occur.
- Systematic removal of loose material, especially kettlebottoms, or, if that is practically impossible, support of the material by posting.
- Use of long bar, instead of pick, in pulling down loose rock, with care by workman to avoid loss of footing or balance and to provide for himself a way of retreat should rock become loosened over his head.
- Require workman to find and attack the outer edge of the weak roof and then bar his way forward working under safe roof.
- Require workman to bar rock on a level or downhill, if that can be done without crowding the barrer and preventing his escape when rock falls.
- Warn workmen against barring down rock where it may slide down on them.
- Avoidance of excessively heavy shooting. Cutting coal at roof may reduce roof shock.
- Use of crossbars or of forepoling where conditions are unusually dangerous.
- Spragging and cocker spragging of coal to prevent coal from falling until ready to shoot face.
- Prompt provision of needed timbers cut to suitable lengths, also prepared cap pieces and wedges; provision of suitable timbers makes men less likely to delay their erection.
- Use of temporary steel or light metal beams to support the roof near the face.
- Use of crossbars as well as posts.
- Systematic timbering behind and at the face and in haulageways, travelways, etc.
- Prompt completion of working faces so as to avoid roof deterioration and timber decay.
- Use of long break lines so that roof will break promptly and not ride pillars.
- Taking out a small percentage of coal in narrow work so as to prevent creeps and make second mining safe.
- Systematic use of safety posts and crossbars at face.
- Careful inspection of roadways.
- Hitching of bars to eliminate necessity for legs which might be knocked out.
- Nailing of planks at level of top of cars between timber sets to prevent their dislodgment by derailed cars.
- Driving and caving wide chambers between headings, when needed, so as to give the roof weakened by moisture an opportunity to expand laterally into the space in the roof thus provided.
- Complete and methodical coal extraction to avoid undue stresses, squeezes and bumps.
- In removal of timber, use of post puller operated either by hand or power, removing in the latter case several posts at a time.
- Close watch for crevices and water breaks in roof and application of special timbering for such occurrences.
- Precautionary timbering and other provisions when widening passageways or starting to drive places in the coal from long-standing headings.
- Speeding extraction of coal to prevent roof deterioration.
- Use of permanent support or roof protection (treated wood, steel, gunite, brick or paint) in any mine openings that have to be used for a long time.
- Use of hard hats.

TO GET THE MOST OUT OF *Mechanization*

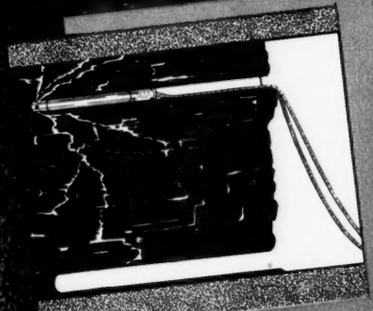
Use CARDOX

THE NON-EXPLOSIVE MINING METHOD



Because CARDOX rolls the coal forward, longer cutter bars can be used.

CARDOX-mined coal requires less digging . . . does not subject mechanical loaders to costly abuses.



Diagrams above show how the slow heaving action of CARDOX dislodges the coal in coarse sizes . . . rolls it forward for quicker, more economical handling by mechanical loader.

● Only when CARDOX is used to dislodge coal can the full benefits of mechanization be realized.

First, CARDOX brings down the face in a manner that permits the use of a longer cutter bar. Its heaving action shears the rib and top clean . . . rolls the coal forward in a loose pile of coarse sizes. This means more coal per face . . . faster loading . . . less wear and tear on the loading machine.

Second, CARDOX produces no smoke or noxious fumes. The crew can enter the working face immediately after the fall.

Finally, CARDOX gives positive protection against overshooting . . . minimizes shatter-cracks . . . reduces cleaning costs.

WRITE OR WIRE FOR A FREE TEST DEMONSTRATION AT YOUR MINE

CARDOX CORPORATION

BELL BUILDING • CHICAGO

BIG COAL-MINING HAZARDS
Haulage Operations

Tons per Fatality

1939 — 2,442,595

1940 — 2,213,726

1939 — 182 Fatalities

1940 — 228 Fatalities

Lynch Coal Operators' Reciprocal Assn.

How to Prevent Them

• Ample clearance at all points with no timber piles along heading tracks.

• Good clean track well designed and constructed with parallel switchthrows at all turnouts, adequate roof support along haulage roads, sufficient rail weight for weight of locomotives and cars, and strict maintenance of desired gage throughout.

• Ample headroom provided for crossbars so that men riding in cars will not have to stoop to avoid collision.

• Parallel switchthrows so that man throwing switch will not be likely to pitch in front of locomotive.

• Clean haulage roads, especially near switches, to protect tripriders and others from tripping and falling hazard.

• Suitable elevation; blocking and ballasting of track.

• Slowing of trips at approach to sharp curves.

• Use of verical curves at local variations of grade.

• Use of guard rails on sharp curves.

• Elimination of excessive gradients.

• Long ties on slopes hitched in ribs to prevent dislocation and distortion of track.

• Accurate control of trip movement by dispatching and block signals.

• Use of reflector buttons to mark approaches to sharp curves, doors or other places where caution should be used or traffic come to a full stop.

• Maintenance of locomotives, cars and couplings in good condition; defective cars shopped promptly.

• Adequate space in locomotive chassis for motorman and triprider.

• Stops on locomotives to prevent front car from rising and injuring motorman.

• No persons allowed to ride on top of locomotive, between cars, on loaded cars or to go from car to car while trip is in motion or likely to start.

• Dry sharp sand so that motorman can rely on its automatic discharge and not have to feed sand with his hand.

• Automatic couplers.

• Drags, derails and other safeguards on hills.

• Car stops and car holders at face and other points as required.

• Derails above inclines.

• Elimination of practice of jumping on and off trips in motion, riding in hazardous positions, coupling on the fly or on inside of curves, working on cars from the tight side, backpoling, crossing traveling cars, pushing trips and other hazardous practices.

• Strict orders against running to catch trips on the fly or to leave trips when they are in motion at any time.

• Mantrips for carrying men into and out of the mine.

• Lights on rear end of trips.

• Daily examination of roof of haulageways to prevent accidents.

• Regular track inspection, especially where derailments are known to have occurred.

• Planks attached to timber sets or posts at car height to prevent dislodging timber by possible derailments.

• Lights at switches, partings and shaft and slope landings with whitewash or paint to increase efficiency of light.

• When splicing ropes, care taken to avoid kinking rope.

• Ropes of sufficient length that at least three laps will remain around the drum when cage is at bottom.

• Ropes examined daily and diameter of sheaves about 40 times diameter of rope, with head sheaves 80 to 90 times that diameter.

• Drum flanges projecting 4 in. beyond the rope when all of it is wound on the drum.

• Adequate brakes, suitable indicators and devices to prevent overwinding.

• Tight clothing for haulageman.

• Safety shoes, hard hats and other protective clothing.

• First-aid training to reduce severity of injuries.

• Hoisting engineers and motormen given a physical examination at least once every three months.

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Trade Mark Reg., 1940

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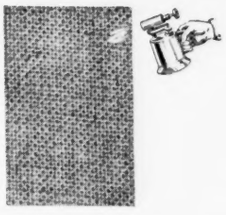

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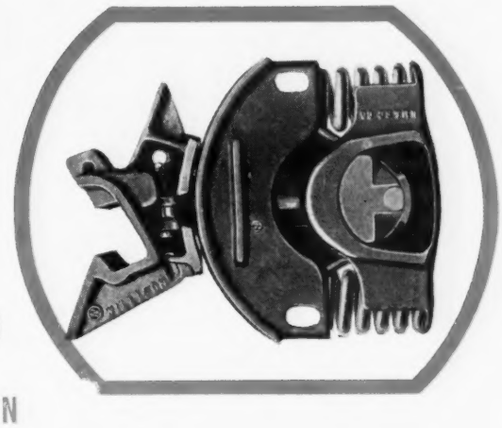
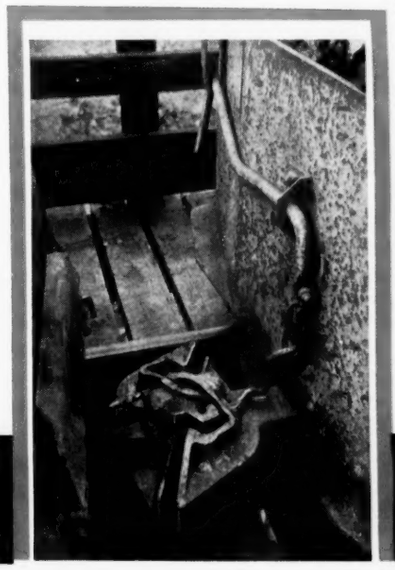
- REDUCED OPERATING COSTS
- GREATER PRODUCTION





In modern mechanized mining methods, the accent is on safety . . . not only safety for men, but safety for equipment as well. Under these conditions, the use of WILLISON Automatic Couplers becomes increasingly important to profit-wise operators. WILLISONS eliminate the cause of costly car coupling accidents to men. Everything is automatic. WILLISONS conserve equipment, cut operating costs, speed up trips, thus allowing more trips per hour which means greater production.

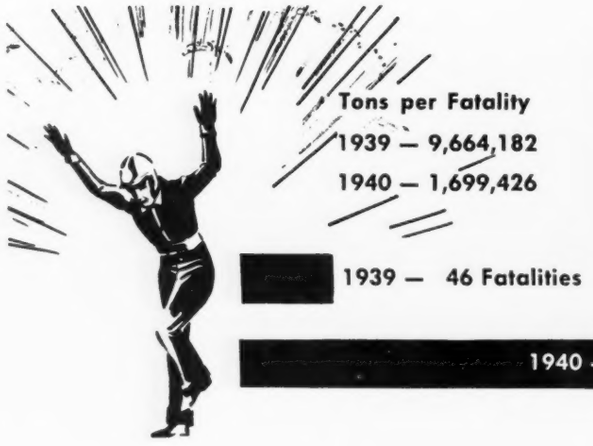
Write for Circular #5240

NATIONAL MALLEABLE AND STEEL CASTINGS CO.

General Offices: CLEVELAND, OHIO

Sales Offices: New York, Philadelphia, Chicago, St. Louis, San Francisco.
Works: Cleveland, Chicago, Indianapolis, Sharon, Pa., Melrose Park, Ill.

BIG COAL-MINING HAZARDS
Gas and Dust Explosions



U. S. Bureau of Mines

How to Prevent Them

• Instruction of supervisors and miners as to hazards of gas and dust and how they may be circumvented.

• Use of permissible explosives, compressed air, compressed carbon dioxide or compressed liquids for bringing down coal.

• Complete stemming of drillholes from charge to collar of borehole so as to prevent blow-out shots.

• Instruction of all men employed underground in proper use of safety lamp, with examination for color blindness.

• Adequate ventilation with plenty of air at *working faces.*

• Exclusive use of permissible magnetically locked lamps.

• Wide separation of intake from return current at mouth of mine so as to prevent recirculation of any part of the main air current. Air should not enter and return by same shaft.

• After main fan has been idle for any length of time, examination should be made of every working face by mine foreman or his assistants before men are allowed to enter mine.

• Double doors provided, one or both of which shall remain closed.

• Recognition that a mine with a safe atmosphere may become highly dangerous if doors should remain open, the fan stop and ventilation be suspended for only a few minutes.

• Search of all men entering gassy mines for matches and smoking materials.

• Fewer men in split than limits prescribed by law wherever mechanical mining results in greater output and causes a release of more gas per man.

• Provision of proper equipment for gas detection, including permissible flame safety lamps, methane detectors and indicators.

• Regular and thorough sprinkling of water, with or without wetting agent, on both sides of cutter bars, at conveyor discharges or dumping points and at other places where dust is formed.

• Enforcement of rule requiring all men using electrical equipment to test for methane on entering a working place permanently or temporarily idle.

• Regular and thorough rock-dusting of the mine to within 40 ft. of the working faces, including rooms and headings and airways not used for haulage.

• Use of enough rock dust to assure against an explosion, as based on volatile matter in coal and percentage of methane likely to be present. (*Coal Age*, November, 1938, p. 87).

• Rock-dust barriers located at strategic locations as a second line of defense against the propagation of coal-dust explosions.

• Permissible electric lamps, machinery, explosive and blasting devices.

• Care in the installation and operation of electrical equipment, circuits, controls, etc., to eliminate arcing or sparking in presence of gas or dust.

• Provision of replacement material for permissible equipment that will be of standard dimensions so as to prevent emission of flame.

• Inspection of permissible and flameproof equipment to see that covers are in place, that their bolts are tight and that electrical cables and bolts are of proper diameter to fill provided openings.

• Self-rescuers for all underground men with provisions for their periodical inspection.

• No repairs to electrical equipment made in a gassy mine until tests have been made for gas; no electric lamps disconnected or connected except by competent men and after a test has been made for gas.

• Training of supervisors and men as to what they should do in case of an explosion.

• Trained rescue men and proper equipment for rescue and recovery work.

Miners' Eyes are Safer in the Safest Mine

...when they wear Goggles all Day

Records* prove that only 15% of mine accidents are due to unsafe physical conditions . . . *that 85% are due to unsafe working habits.*

The most unsafe of *all* such habits is working without goggles. And in many mines, surveys show that hundreds . . . even thousands . . . of eyes are wide open to trouble. Hundreds and thousands of needless risks—and it only takes *one* eye-accident to inflate *your* costs from 1c to 5c a ton.

Eliminate these chances for eye-accidents, before they eliminate your profits. Get *all* the unguarded eyes in your mine safely behind comfortable American Goggles. This is a job that your Mine Safety Appliances representative knows how to do quickly and thoroughly. Turn it over to him *today*.

*Source of these figures cited on request.

PATENTED

FUL-VUE GOGGLES . . . light, good-looking. Three size-ranges for individual fitting. Deep-curved, extra-strong Super Armorplate Lenses.

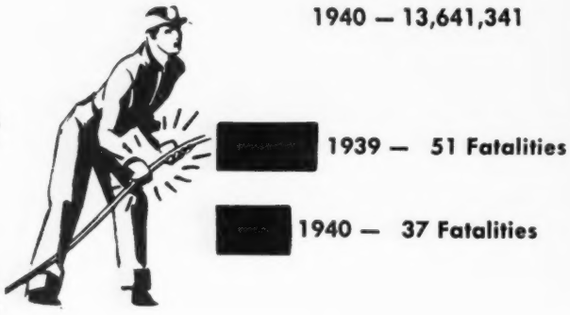
American Optical Company

Southbridge, Massachusetts

REPRESENTED IN THE COAL MINING INDUSTRY BY MINE SAFETY APPLIANCES COMPANY, PITTSBURGH, PA.

BIG COAL-MINING HAZARDS

Electricity



How to Prevent Them

• Proper guarding of bare conductors, use of insulating mats or platforms, inclosure of transformers, converters, motor-generator sets, rectifiers and other electrical and control equipment.

• Use of automatic circuit breakers for every section of mine so that in case of a short circuit, extreme overload or ground that section will be isolated automatically.

• Sectionalizing switches to cut off current from parts of mine not being operated.

• Use of inclosed or otherwise protected switches, starters and controls.

• Thorough grounding of electrical equipment and electrically operated machinery, including use of separate ground wires in trailing cables.

• Use of shielded cables with ground wires, particularly for high voltages.

• Use of safety taps with adequate fuses on trolley line.

• Regular inspection and maintenance in good condition of electrical equipment and electrically operated machinery.

• Regular inspection and reconditioning of trailing cables. Temporary splicing done carefully so as to make cable as effective electrically and as strong as a new cable, and the number of such splices before vulcanizing or other reconditioning strictly limited.

• Provisions for automotic closing of doors of transformer rotary-converter, motor-generator and rectifier rooms in case of fire.

• Ventilation of transformer, motor-generator, rotary-converter, rectifier and charging stations with intake air passing through station to return at a point sufficiently remote from timber sets and shaft timber that it will not involve these should an electric fire be started.

• Well bonded and cross-bonded track to prevent stray currents, sparking at rail connections and also the heating of equipment because of inadequate voltage at machine motors.

• Care to scale roof by which electrical conductors are to be supported and to have clamps as near as may be in line and level.

• No men working on "live wires" even when voltage is low.

• Locking of switches on the "off-position" by all operatives when working on a power line, with the switch between operative and source of power.

• All power wires cut off when timbers are being set over or near electric wires.

• Trailing cables wound in the form of a figure of eight to prevent excessive heating and when not in use disconnected from the machine and switches unless the switch can be locked in the off-position.

• All electrical equipment put in safe condition or taken out of service before being left at the end of the day.

• Training in first-aid and resuscitation to prevent injuries or shocks from becoming fatalities.

• Proper training of men who have to install, repair or handle electrical equipment.

• Trolley wires carefully guarded where less than 6½ ft. above rail, especially at points where they cross the track; at switches also and at places where men embark and disembark from mine cars, as also in other places where men must work or pass under such wires.

• Suspension of trolley wire on opposite side of track to that on which clearance is provided.

• Hard hats to protect wearers in case of contact with "live wires."

• Use of shoes having non-conducting soles and "hard toes" by all persons working on or around portable electric equipment.

• Use of approved insulating gloves by all men whose duties require them to handle trolley poles, trailing cables or wires by which connections are made from portable equipment to power sources.

- - AND PAY YOU DIVIDENDS IN THE FORM OF LOWER OPERATING COSTS

★

For more than 23 years the Bituminous Casualty has insured the compensation risks of the industry whose name it bears, always trying to improve its service and forever striving for improvements which benefit workmen and operators. Bituminous Casualty assets top the 8 million mark and for the additional security of policyholders there is reinsurance, in excess of $20,000; up to one million dollars to protect the Bituminous in the event of catastrophe or unusual loss. It's a company tradition that just claims are paid promptly.

★

WORKMEN'S compensation insurance and service is so vital to your business life that you can't afford to select any but the very best insurance carrier. In the country's major coal fields a place of honor and trust has for years been reserved for the Bituminous Casualty Corporation.

Bituminous Casualty mine safety engineers hold the respect of operators, superintendents, and miners, for their knowledge and practical application of coal mine safety. Many of them, company officers too, held their first job in the mines and they know where to place the feather-line between scientific theory and practical operating methods.

Bituminous Casualty service men are ready to work with you and your men; ready to demonstrate a system of insurance which has established an American precedent for so hazardous a line. Bituminous Casualty's low cost of doing business—far below the average of other companies—is proof of a sympathetic viewpoint in proposing insurance rates which influence your production costs. As a stock company Bituminous Casualty assumes the entire risk covered by a policy, dismissing from your mind the worry of contingent or actual liability often incurred by policyholders of other types of insurance plans.

Write for details. No obligation.

BITUMINOUS CASUALTY CORPORATION

ROCK ISLAND ILLINOIS

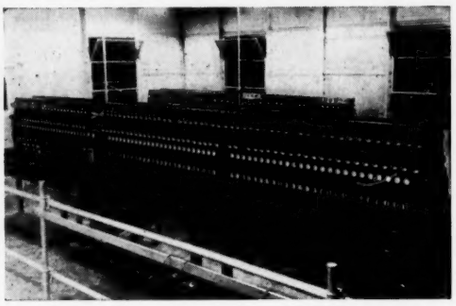
Is A Gradual Blackout Slowing Your Production?

Keep Light Volume Steady . . . with PORTABLE'S CAP LAMPS

Blackouts are safety necessities in European cities—but they have no place in a coal mine. Under ground it's essential that your men have all the light you can give them.

Because it employs the lead acid type battery, Portable's Cap Lamp is guaranteed against gradual blackouts—guaranteed to furnish a constant amount of light every hour, every shift, as long as it remains in use. Some cap lamps now on the market give only about half as much light after four years of use as they do when they are new—but Portable's Lamp always remains at new efficiency.

Protect yourself and your men against the dangers of gradual blackouts. Steady light can mean more production for you and more safety for them. Write for complete details of Portable's Cap Lamp.

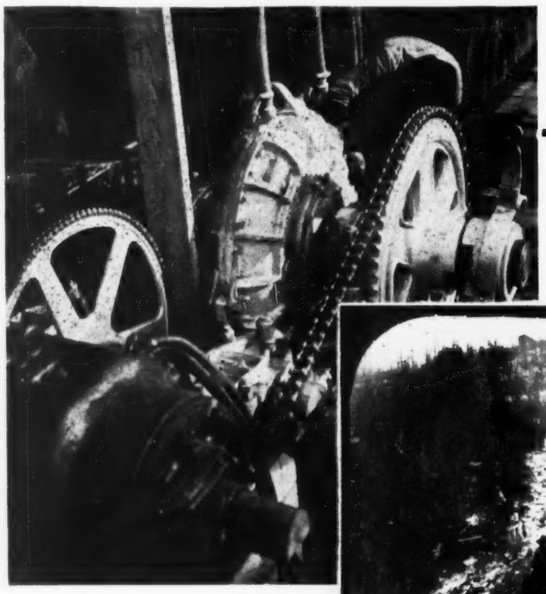


Installation of 160 Portable Lamps in the High Shaft Mine of Steubenville Coal & Mining Co., Steubenville, Ohio. Construction of these lamp racks permits miners to serve themselves.

Installation of 425 Portable Lamps in the Cranberry Mine of the New River Co., Mt. Hope, W. Va. These lamps have been supplying a constant amount of light for almost two years.

Portable LAMP & EQUIPMENT COMPANY

OFFICE AND WAREHOUSE · 72 FIRST AVE. · PITTSBURGH · PA. · PHONE ATLANTIC 0515



A 36" PARKERSBURG HYDROMATIC BRAKE in use on a monitor system, Berqoo, West Virginia.

View of typical slope hoist on which PARKERSBURG 10½" HYDROMATIC BRAKES are being used.

Safety Assured

. . . ON SLOPE HOISTS, SHAFT HOISTS, MONITOR INCLINE SYSTEMS, RETARDER CONVEYORS . . . with PARKERSBURG HYDROMATIC BRAKES!

● *DON'T* suffer costly production losses through accidents to men and equipment on hoisting operations . . . install PARKERSBURG HYDROMATIC BRAKES. A tested product, these guaranteed safety devices will soon pay for themselves in maintenance savings alone. The action is completely automatic . . . the faster the load speed, the greater the braking resistance. No friction . . . no danger of fire . . . load is always completely controlled. HYDROMATIC BRAKES come in three sizes . . . 10½", 15", 36". Investigate their possibilities.

For further details, see the 1941 edition of the COAL MINING CATALOG—Page 79.

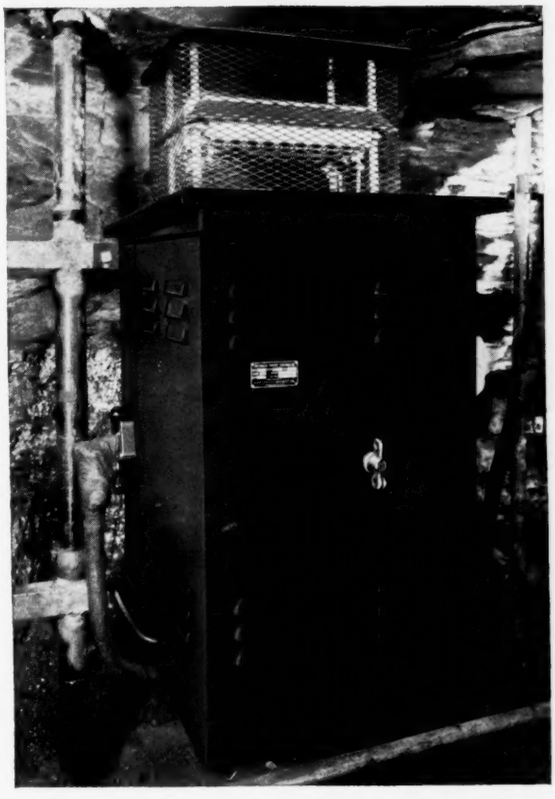
The PARKERSBURG RIG & REEL Company

★ PARKERSBURG, WEST VIRGINIA ★

SAFETY UNDERGROUND

Hazards of Fire and Explosion Minimized by SECTIONALIZING CIRCUIT BREAKERS

State and Federal mining authorities have long recognized that electrical disturbances are the chief cause of mine fires and explosions. Experience with investigation of disasters and with inspection of mines having high safety records, bears this out.



When protection of main feeders and branches is left to a substation-switchboard circuit breaker, disturbances out on the fringes of the system can occur without registering at the substation. On the other hand, sectionalizing circuit breakers of small rating, located out in the system, are highly sensitive to faults nearby and are able to open quickly. Their opening is the principal step in prevention of dangerous arcs or of annealed trolley wires.

While the avoidance of even a very small mine fire will return the cost of a complete sectionalizing installation, there are other reasons why such an investment is profitable:

1. Increased production from better operating continuity.
2. Reduced maintenance from preventing machine-abuse.
3. Decreased power consumption.
4. Improved voltage from tying feeders together.

Let I-T-E engineers tell you about safety as well as the other factors which justify sectionalizing.

Typical automatic-reclosing, sectionalizing circuit-breaker for underground service.

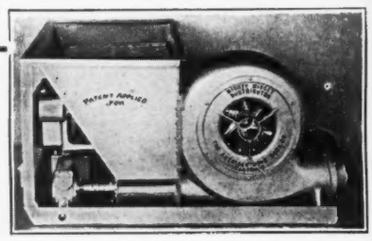
Representatives in Principal Cities

I-T-E CIRCUIT BREAKER CO., PHILADELPHIA, PA.

ACHIEVE THE *SAFER OPERATIONS* THAT BRING REDUCED COSTS . . . *install*

★ ★ ★

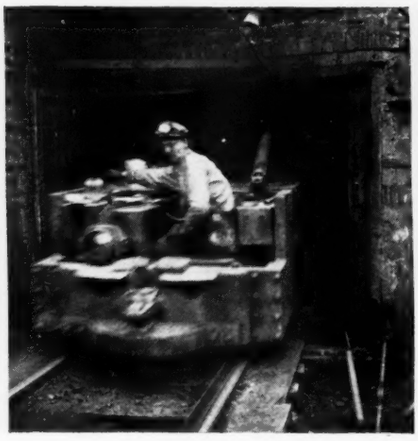
American MiDGET ROCKDUSTERS



Above: Portable units, easily hauled . . . they distribute more than a TON OF DUST per hour. Dust each room as it's loaded out, and destroy the danger of an explosion at the face.

Right: Provide a positive airlock . . . eliminate the human element. No door trappers required. Opens and closes automatically before and after a trip.

American MINE DOORS



American "ELECTRI-THROW" SWITCH

Above: They throw the switch electrically . . . eliminate accidents that occur when switcher must leave moving trip to throw switch. Saves time, too.

Canton Automatic Signal Systems guarantee safe and efficient control of any number of cars . . . accidents are avoided . . . operations speeded . . . a system of red and green lights that never fails.

● The AMERICAN MINE DOOR COMPANY stands in the front rank as a source for products that not only guarantee safety, *but step up out-put all along the line as well.*

The MIDGET ROCKDUSTER . . . assures low-cost protection against explosions at the face. The "ELECTRI-THROW" SWITCH . . . saves time and accidents through automatic switching. AMERICAN MINE DOORS . . . a proved-thru-use method of increasing ventilation safety and efficiency. CANTON AUTOMATIC SIGNAL SYSTEMS . . . directing traffic so as to eliminate accidents and delayed trips.

Here, then, are products you can use . . . to achieve greater safety, plus reduced operating costs. Numerous operators are enjoying the benefits these AMERICAN products can bring . . . investigate them as applied to your operations. Write, wire or phone today!

AMERICAN MINE DOOR COMPANY 2057 DUEBER AVE. CANTON, OHIO

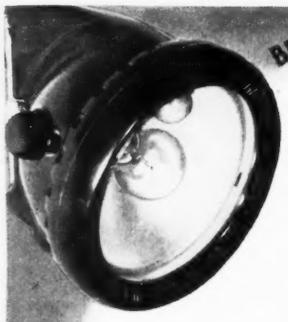
Yes WHEAT *means Safety*

PLUS LIGHTWEIGHT AND MORE LIGHT

KOEHLER

FLAME SAFETY LAMP

Safer because more gauze area gives greater ventilation and improved sensitivity. It is simple, rugged, dependable — Designed and built for hard Service, its operating cost is small.



Safety against Blackouts
Safety against Loss of Voltage
Safety against Battery Spilling

Safe against blackouts because of the spare "emergency" bulb in addition to the regular Krypton-filled bulb mounted to eliminate "black spots". Safe against *dimming* before the end of the shift, because of extra capacity and improved battery construction. Safe against spilling solution, no matter how the battery is carried or handled — there being less than ½ ounce of free solution per cell. Also . . . . . the fact that the Wheat can be put on charge (or taken off) by a mere twist-of-the-wrist (without any parts to take apart) make for safety against delay and trouble in the lamp house. Yes—the lightweight more-light WHEAT is the SAFE cap-lamp-and-battery that sets a new standard in the mining field. Send for details today.

The battery that doesn't spill on you

KOEHLER SAFETY LAMP

WHEAT CAP LAMP

KOEHLER MFG. CO.
Marlboro . . . Mass.
Eastern Bituminous: WHEAT LAMP SALES, INC., 1501 Kanawha Valley Bldg., Charleston, W. Va.

RUGGED · DEPENDABLE SENSITIVE

TWINS OF MODERN MINING

BETTER LIGHT · LESS WEIGHT NON-SPILLABLE

— you don't need DANGER SIGNS on a "Whaley Automat"

● Never before has SAFETY and ACCIDENT PREVENTION played such an important part in coal mining. But, for over 33 years of building mechanical loaders exclusively, from the original design to every improvement since, our engineers have built SAFETY into every part of the Whaley "Automat." The main frame section of a loader is a pivot support point of the extended and heavy loader and rear conveyor sections, and, to a certain extent, one must balance the other. Bearing this picture in mind, it is easy to understand how the rear conveyor suddenly reacts sideways to any sudden sidewise jerk which can occur with some types of loading devices. Such action, particularly in close places, may result in the dangerous knocking down of timbers, or a crushing injury to some operator. Such dangers cannot happen however, with the Whaley "Automat," because of its exclusive vertical lift shoveling device. Note the motion illustrations at left showing the vertical lift shovel action of the "Automat." After moving forward under material, the Automat Shovel lifts and simultaneously pulls backward for depositing material on Jib conveyor, and then returns to shoveling position for more material. No dangerous side-kicking of machine . . . no dragging of shoveling mechanism . . . no knocking out timbers in close places . . . no breaking or digging into bottom. Don't overlook the importance of SAFETY in mechanical loading. SAFETY is a predominating feature with the "Whaley Automat," and has been for 33 years.

MYERS-WHALEY CO.
Only an "AUTOMAT" Shovels

MECHANICAL LOADERS EXCLUSIVELY FOR OVER 33 YEARS

SAFETY FIRST . . . *but* PROTECTION TOO!

Supposing this had been one of your Employees . . .
Would he have been able to smile?

HERE'S a faithful worker laid on the shelf by disabling accident. (For accidents do happen, in spite of all our best-laid Safety programs, commendable as they are).

Still he can smile as he chats with a Company representative, because a Provident HUMAN SECURITY Plan is helping him meet the extra expenses caused by the emergency.

ARE YOUR EMPLOYEES SO PROTECTED?

Many leading coal mining industries have adopted the time-tested Provident program that brings their Employees swift help in such emergencies as

- **Death in Family**
- **Death of the Employee**
- **Loss of time through accident or sickness**
- **Dismemberment**

SEASON'S GREETINGS

To our many friends and patrons throughout the Coal Mining industry we extend best wishes at the Holiday Season

PROVIDENT
Life and Accident Insurance Company

CHATTANOOGA • Since 1887 • Tennessee

• ***Pioneers in providing HUMAN SECURITY Protection for Coal Mine Employees*** •

FOREMEN'S QUESTION FORUM

With Small Furnace and Curved Form Old Rails Are Readily Bent to Form Steel Arches

WHEN MASONS purpose to build a brick arch, they construct with wood a more or less semicircular "centering"; they then support its ends on vertical posts, arrange bricks and mortar over it, and when the mortar is set they remove the centering, and then the bricks crowding each other block the space and make a safe covering which holds tight even if some of the mortar falls out. When heavy roof loads have to be supported, steel arches that will yield a little without breaking and let the rocks down produce by their yielding a crowding of the roof rock similar to the crowding of the brick which occurs when its centering is removed.

Thus the main rock supports itself, and the loose rock below it, that cannot arch, is held up by the steel arches. Held stiffly in place by a post or solid timber, the main roof mass cannot sag and crowd on itself and so cannot carry the weight as the bricks do. Thus the weight may be and often is more than post or timber can sustain, and, in any event, the timber soon rots and loses its carrying capacity unless treated.

Discarded Rails Hold Roof

Old steel railroad rails can be used for such arches, and these have been used at the Greenhill mine of the West Canadian Collieries, Blairmore, Alberta, Canada, for supporting the roadways in a seam from 12 to 30 ft. thick and pitching at 34 to 40 deg., mention of which was made in *Coal Age*, June, 1940, p. 33. Thirty-foot rails are cut in the center to make two 15-ft. lengths. To ease the work of bending and to anneal them so that they will bend without breaking, they are first heated in a furnace, said H. Blake, mine superintendent, at the annual Western meeting of the Canadian Institute of Mining and Metallurgy, Oct. 3.

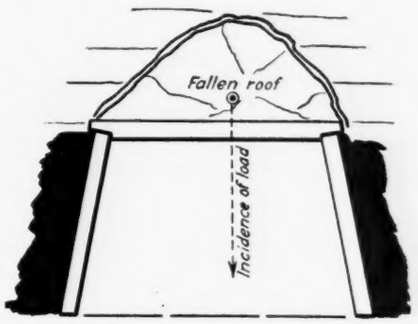
One end is locked in a form and, with a roller attachment connected to a small electrically driven hoist, the hot rail is rolled into shape. After cooling it is ready for use. The rail is heated in a long brick oven fired by coal dust, which latter is fed by worms and a fan. A small crane lifts the hot rail and places it in the form.

Arches thus made are of 15-ft. span and 9 ft. 6 in. high. The set has to rest on a smooth bottom or it will rock and split. At first, concrete blocks were placed at the feet of the arch, but these were found inconvenient. Later a ⅜x6x6-in. plate was cut and on this were welded two ⅜x1x4-in. lugs just wide enough to fit into the web of the rail. A few taps with an ax drive these plates into place. On the ditch side of the gangway, to allow for the initial settling, two 3x10-in. planks are laid as footing for the set, which otherwise would have to rest on the soft bottom of the ditch; on the high side, the foot of the set rests on the coal bottom.

Sets are joined by fishplates and lagged by ordinary 4-in. round-timber poles. Latterly, ⅜-in. square-bar lagging has been placed over the shoulders and tops of sets, and this, in turn, is covered by sheet iron, but the vertical sides are still lagged with poles. The square bars are made to cover three sets. One end of these bars is bent so that it can be hooked over the base of the rail. Each bar extends over the next set to the one beyond it, where a tool known as a "lagging bender" turns it snugly up against the base of the rail. Laggings are spaced 4 to 6 in. apart and are hooked to alternate sets; thus all the sets are locked together. Over these are laid galvanized sheet iron and any spaces left are filled with slabs.

Advantages in Use of Steel—In driving gangways, miners soon learn how to cut the coal to the shape of the sets, so that little room is left behind them to be filled with rock. By shaping the shoulders of the heading to fit the arch, the sets sustain no dead weight such as is imposed where square sets are installed, because, with the latter, coal and rock tend to break into a natural arch, with most of the loosened rock at the center of the set, which has therefore to bear the bulk of the load. With the square set, roof often falls and has to be cleaned up just at the unhappy moment when a record tonnage is desired (see illustration).

Where there is a strong conglomerate roof, rails are used as props on the high side of the roadway, as described in the article already mentioned. In No. 2 seam two return airways on 33-deg. pitch are supported



With a three-piece square set, the depth of fallen rock is greatest at the midspan, where the crown bar is weakest, but when a steel arch is provided the unbroken rock more nearly touches the supporting material.

for 1,000 ft. by arches of 1x2-in.x16-ft. lengths of flat strap iron locked at the top of the arch by a V-notch or crotch. These arches are 12 ft. wide at the bottom, 12 ft. high at the center and are spaced 3 ft. apart. They are backed with ⅜-in. square laggings about 8 ft. apart and then covered with slabs. The cover over some of the rail arches is 1,000 ft. vertical.

Some crushing has been experienced, but, by using slab packing, especially on shoulders, the sets stand up well. The first steel was installed 10 years ago and none of it has had to be repaired. One or two sets have bent a little toward the bottom, probably because pillars were drawn directly above them, though big pillars left above the airway afforded some protection. Mr. Blake added later that not a set had broken. Replacing old wood sets by steel-rail arches was less costly by $2.77 per yard than replacing these same sets by wood. The saving is in the labor cost. In discussion, Mr. Blake declared that a steel set can be erected in 30 to 35 minutes. Timber in return airways lasts 3 to 5 years. The rails will snap if curved cold.

When Roof Strain Makes It Necessary to Drive Roads in Rock; How Coleman Did It

IN HEAVILY pitching coal where more than one bed is mined and the beds are thick, it often becomes necessary to drive the main roadways in the solid rock floor, so that roads with gentle gradients can be driven to the pitching beds, for here the trouble is not from weathering, and the collapse of the roof cannot be cured by gunite, paint or air-conditioning and sometimes not even steel arches seem likely to furnish a solution. Such a problem presented itself at the mines of the McGillivray Creek Coal & Coke Co., Coleman, Alberta, Canada, where two seams are worked that dip throughout the property at a uniform pitch of 30 deg. The seams are 125 ft. apart, according to J. J. McIntyre, in an address delivered at a session of the Western meeting of the Canadian Institute of Mining and Metallurgy, Oct. 3.

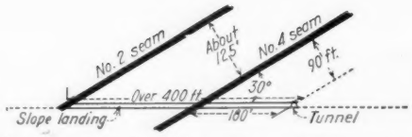
Early in 1935, a 9x12-ft. main gangway, starting at tipple level, was planned, to be used for the hauling of coal lying to the rise in the southerly part of the tract and also to carry coal received from slopes driven to the dip; it also was decided to drive an 8x11-ft. rock slope for the dip area, which was then being served by a steep slope on the full pitch of No. 4 seam.

Put Roadway Under Coal—A strong sandstone underlying the shales by which the

No. 4 seam is underlaid was chosen as the location for the gangways. Stratigraphically, the base of this rock was 90 ft. below No. 4 seam, an interval adjudged sufficient to protect the roadway whenever the seam above it is extracted and one which, with the prevailing pitch, would provide room for a horizontal slope landing of 180 ft. through the rock to No. 4 seam and of over 400 ft. to No. 2 seam. Thus far, this sandstone has stood without support.

Use Wet Drifter Machines—Two wet drifter machines operating on a bar set across the face drill the 9x12-ft. main gangway tunnel. The rock is not exceptionally hard to drill but is tough to blast, requiring 28 holes to a round, but slips in the rock and changes in its consistency sometimes necessitate 34 holes. In readily breaking ground, 6-ft. rounds are the rule, but in tougher sections an advance of even 5 ft. sometimes is difficult to attain. Under special permit, Polar Forcite dynamite, No. 6 delay-action electric caps and a 40-shot Davis-Derby battery are used. Each round requires 70 to 100 lb. of explosive.

Drill and Muck at Same Time—Rock is mucked by a Nordberg-Butler track-mounted shovel. With nine props in a battery, blasted rock is kept close to the face, thus after each round no long stretch of rock has to be cleaned. With this type of mucker, drillers and muckers can work at the same time



Seams pitch at 30 deg. and are 125 ft. apart.

if all the round is shot at one time and if the lifter shots throw the muck back far enough to let the drillers make their first set-up. The machine can load all the rock except that on which the drillers stand, and this is lifted when they are lunching.

Before the last few months, two shifts daily were the rule, one round on each shift. Muckers on the morning shift started two hours before the drillers and thus were able to load rock when the miners were completing the round and preparing to blast. Two hours elapsed between morning and afternoon driller shifts, but, with only one round daily, rock can be drilled and mucked on different shifts.

Wrap Joints of Air Pipes—Blower fans with 18-in. galvanized pipe in 11-ft. 6-in. sections are now used to conduct air to the face. Air loss in the 3,500-ft. of distance is greatly reduced by binding airtight wrappers over joints. To carry the air that distance, two booster fans had to be placed in the line.

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System Adopted in Training Mining Employees In Safe and Efficient Mechanical Loading*

By R. R. KNILL

Safety Engineer, Union Pacific Coal Co.
Rock Springs, Wyo.

ECONOMY and safety in mechanization have been attained by introducing mechanization piecemeal over a period of eight years at the mines of the Union Pacific Coal Co. Originally it was planned to make the mechanization complete in ten years. This plan allowed time to experiment with various kinds of equipment and systems of mining. Retreat from an established boundary by a room-and-pillar system was found the preferable method of operation. But the plan also allowed the company to train many supervisors and crews by shifting men around until combinations were found that would work together. Formerly, every mine had a foreman and two assistants; now there is one foreman and several so-called "unit foremen," though usually a foreman has control of two units and even sometimes three.

Choosing the Right Man—These men are chosen from men who have shown leadership in their respective crews. Choice usually is made from sons of present or former employees, preferably those having a high-school education; thus, as they come from local mining families, they are likely to be permanent, and, because they are young, they have no tradition of hand loading to break down. Employees are hired by the general superintendent except at one outlying district. He interviews all applicants, ascertains their background and their probable permanency in employment. Stress is laid on the last factor, as training of an employee takes time and costs money.

Starting Right Is Much of the Battle—The applicant is sent to the doctor for a physical examination and to the optometrist for a report on his eyes. If physically fit, he is sent to a district superintendent, who informs him that he must wear a hard hat, hard-toed shoes and safety goggles while on duty, which does not include the lunch period but does cover the time when entering and leaving the mine. He has to enter and pass the first-aid course as prescribed by the U. S. Bureau of Mines and is told that he is expected (though not required) to attend all safety meetings in his district.

He receives a Book of Rules which he is required to sign and is advised to familiarize himself with these rules and abide by them. He is then assigned to the mine and sent to the mine foreman, who reiterates the superintendent's advice, especially in regard to safety.

Training for Shaking-Conveyor Work—A new man may be started to work in several ways. First, if he is to join a shaking-conveyor crew, he is assigned to a crew leader with demonstrated training ability. Either this leader or the unit foreman personally sees that he arrives safely at his working place. For a few days, he is an extra member on the crew and for part of his time he helps in various operations. Both lead man and unit foreman observe him closely to learn his adaptability to certain types of work.

Later, usually, he is assigned as a face man or loading-head man, where he learns more about the several operations. Then he becomes a ratchetman or duckbill operator and has to be proficient before he is assigned as an operative. His next step is that of a cutting-machine operative, in which position he is recognized as crew leader, being in charge in the absence of the unit foreman. If the man reporting to the mine foreman is an experienced cutting-machine operative he sometimes is placed on the crew as such if there is immediate need for such a man, but in general he has to follow the usual course, though his progress may be more rapid than that of an inexperienced man.

Training for High-Coal Loading—In the district where the coal is 32 ft. thick and is mined with mobile loaders, a group of five or six men work with each loader. Whenever one of these men is assigned to this work he is sent into the mine under the personal supervision of a unit foreman and usually is assigned to clean-up work in the rooms. Here, he can familiarize himself with the working places and see how the machines are operated. A few days of this and he may be assigned to other kinds of casual labor. Seldom if ever are new men assigned to mobile loading.

Usually a man who has been in the mine three or four months is taken and assigned as a "nipper" on the haulage crew of the unit. Later he becomes motorman, then helper on the loading crew and then full operative, by which time he has become proficient in both haulage and loading. Men who are not assigned to loading crews are instructed to help timbermen or tracklayers or to assist drillers where the coal is not drilled by the mechanical loading crews.

All Men Receive Training

Training for Men Other Than Miners—Mechanics, electricians and welders serve as apprentices for six periods each of six months. At the end of each period the wage of such a man is increased and after three years he becomes a journeyman.

Members of the supervisory staff also are trained. As already stated, unit foremen are chosen from any able crew leaders. Each one receives a Book of Standards setting forth definite ways in which his work is to be done.

Other foreman training is made possible through weekly staff meetings which are conducted by the district superintendent and are attended by unit foremen, mine foremen, machine bosses, the resident engineer and frequently by general mine officials. Mining and safety problems are discussed.

During the winter, foremen training classes also are held in each district, one of the staff other than the superintendent being designated as leader. Mining problems are discussed in detail. Once a year all the supervisors in the district meet and dine with general office officials, at which time the policy of the company is set forth by its vice president.

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* Abstract of an address delivered at the meeting of the Mining Section of the National Safety Council, Chicago, Oct. 8, and entitled "Training Personnel in the Problems of Mechanical Mining — Bituminous Coal Mining."

QUESTIONS ASKED BY STATE BOARDS

Examination of Applicants for Certificates Of Competency as Mine Boss, Indiana

To Get Safety Rules Obeyed

Q.—How can a mine foreman best gain and hold the respect of the workmen and always have his instructions carried out?

A.—By knowing his business, by keeping his promises and his temper on all occasions, by not revoking his disciplinary orders when once issued, by convincing his men that he has their interest and safety at heart, by obeying his own safety rules and the State laws, and by putting company compliance with safety regulations and practice ahead of employee compliance. On the safety road, the company and its officials always should lead the way.

Why Split Air Current

Q.—(a) What are the advantages of frequently splitting the air current? (b) What are the requirements of the Indiana law in regard to such splitting?

A.—(a) From the safety viewpoint, air splitting makes it probable that, if an explosion should occur, the number killed or injured will not exceed the number of men in the split. The explosion, it is true, may spread beyond the split, but, if confined thereto, its lethal gases will not travel so far as they would with continuous ventilation.

From the health and comfort standpoint, and in some degree from the safety angle also, it is not well to have too many men on any one split. With many men on a single air current, also, the smoke sometimes is dense enough to cause accidents, partly from the obscured vision of the men and partly from their loss of vigor. The objection to ventilation by continuous current is less valid from the safety and comfort basis now that shooting is done off-shift.

From an economic standpoint, splitting pays, as it reduces resistance to passage of air, for the air needed for the respiration of all the workmen in the mine does not then have to be compelled by expenditure of power to enter every entry in turn.

On the other hand, where the number of men in a split is small, it often would be better not to weaken the force and speed of the air in each split by spreading the available air over so many splits. A long split, especially with the full number of men permitted by law, may make it necessary to put a stiff regulator in the shorter, smaller splits with resultant power losses.

(b) Sec. 23, Paragraph *g*, Mining Laws of Indiana, requires that "currents of air in mines shall be split so as to give separate currents to not more than 75 persons at work, and the chief inspector of mines shall have discretion to order a separate current for a smaller number of men if special conditions render it necessary."

Examination for Coal-Mine Officials State of Colorado

In Colorado on the morning of the first day of the examination, the candidates for certification as coal-mine officials were presented with a series of statements that they were asked to declare true or false by putting a cross under the word "True" if they believed it true and under "False" if they believed it false. In presenting the replies, comments have been added in square brackets.

	True	*False*
1. A uniform system of checking the men into a mine is a good system, but is not required by the coal mining law.		(X)
[Checking employees of mine in and out is obligatory.]		
2. When a coal mine is abandoned, the coal-mine inspector should be notified.	(X)	
3. In all underground workings, on approaching a property line, a 100-ft. barrier pillar should be left.		(X)
[50 ft. on each side of the line, unless owners agree in writing on its removal.]		
4. Only steel or copper tamping bars shall be used for stemming permissible powder or other explosives where detonators are used.		(X)
[Only wood tamping bars may be used with such explosives.]		
5. The coal-mining law recommends the use of fine slack coal for tamping shotholes.		(X)
[Clay or other incombustible material must be used.]		
6. Shots should not be tamped to the mouth of the drillhole.		
[Shots should be tamped to mouth of hole.]		
7. Undermining or shearing the coal is permitted but not recommended by the State coal-mine inspection department.		(X)
[Undermining or shearing 6 in. deeper than the shotholes is required unless chief inspector releases owner of this requirement.]		
8. Where permissible powder is used, a single shot may contain 2½ lb. of powder.		(X)
[1½ lb. is limit.]		
9. When desired, dependent shots will be allowed.		(X)
[Dependent shots not permitted.]		
10. All headings should clear the rail 3 ft.		(X)
[Rule is that, on passing side, headings driven after passage of act shall be 2½ ft. clear of side of car.]		
11. All doors, stoppings, overcasts, undercasts, and regulators up to within 500 ft. of the working face, shall be made of, or covered with, combustible material.		(X)
["Combustible" should read "incombustible".]		
12. In places where mechanical loading is employed, open lights may be used.		(X)
[The law declares: "In parts of mines where noxious gases are generated in dangerous quantities, the chief coal-mine inspector may prohibit the use of any kind of lamp which is unsafe," and accordingly "Regulations for the Use of Mechanical Loading Devices Where Shooting Is Necessary at Irregular Intervals" states among other matters that "in no case shall open lights be used by men operating mechanical devices."]		
13. All electric power wires underground, excepting trolley wires, shall be carefully and thoroughly insulated.	(X)	
14. In dry and dusty mines where water is not available, and rock dust is used to prevent coal-dust ignitions, the rock dust used shall constitute 50 per cent of the mixture.		(X)
["Where stone dust or adobe dust is used, it shall constitute not less than 60 per cent of all dust present."]		
15. Oiling or greasing mine cars		

	True	False
inside the mine is recommended.	(X)	
[Oiling or greasing of cars inside the mines is strictly forbidden unless the place where said oil or grease is used is thoroughly cleansed once every day to prevent accumulation of waste oil or grease on the roads or in the drains at that point.]		
16. Every mine owner shall endeavor to have at least 50 per cent of his employees trained in methods of first aid to the injured.	(X)	
[At least 20 per cent, not 50 per cent, is specified.]		
17. Intoxicating liquor is permitted in and around coal mines.		(X)
[No miner, or other person, shall carry into, or use, in a mine intoxicating liquors or alcoholic beverages.]		
18. Mine tools and men may ride in the same cage.		(X)
19. Any fireboss who neglects to comply with the coal-mining laws may be suspended.	(X)	
20. A fireboss may use an open light if he so desires, when making his examination of places in the mine.		(X)
[In making the examination, a fireboss shall use no light other than that inclosed in an approved maget-locked safety lamp when testing for gas.]		
21. The mine foreman or his assistant must measure the air currents once every month.		(X)
[At least once every week.]		
22. Escapement shafts less than 75 ft. deep shall have a hoisting plant installed.		(X)
[Hoisting plant must be installed at escapement shaft if latter is 75 or more feet deep.]		
23. Traveling ways around the bottom of a shaft shall be 5 ft. wide and 7 ft. high.		(X)
[Dimensions required 3x6 ft.]		
24. Mine maps shall be made on a scale of 50 ft. to the inch.		(X)
[Scale shall be not less than 100 ft. nor more than 200 ft. to the inch.]		
25. The owner of a mine shall see as far as possible that every employee shall have a copy of the State coal-mining laws.	(X)	

Q.—An airway is 6½ ft. high and 9 ft. wide. The velocity of the air current is 425 ft. per minute. What quantity of air is passing per minute through this airway? Formula: a × v = q.

A.—Width of heading = 9 ft. Cross-sectional area of heading is 9 × 6.5 = 58.5 sq.ft. The velocity of the air current being 425 ft. per minute, every minute a slug of air 425 ft. long and of 58.5 sq.ft. cross-section will pass through the airway, or 24,862.5 cu.ft. of air. Quantity of air therefore equals about 25,000 cu.ft. per minute.

Questions and Answers, Examination for Anthracite Foremen and Assistants*

Blasting in Gassy Mine

Q.—What are the provisions of the mining law concerning firing of blasts in gassy mines?

A.—No blast shall be fired in any mine where locked safety lamps are used except by permission of the mine foreman or his assistants; and before a blast is fired the person in charge must examine the place and adjoining places and satisfy himself that it is safe to fire before such permission is given.

Q.—A main airway at the bottom of a slope measures at one point 10x7 ft. and at another 12x8 ft. In the first, the anemometer shows 400 revolutions per minute and in the second 350 revolutions per minute. What is the quantity of air passing per minute?

A.—Cross-section at first measuring station is 10x7 = 70 cu.ft. At the second, it is 12x8 = 96 cu.ft. The anemometer being gaged to show one revolution for every foot of velocity per minute, the velocity in the two instances is 400 ft. and 350 ft. per minute respectively. The quantity of air passing q equals the cross-sectional area a multiplied by the velocity in feet per minute, v, or $q = av$.

In the first measuring station, the quantity passing is 70x400 = 28,000 cu.ft. per minute and in the second 96x350 = 33,600 cu.ft. per minute. If the latter figure is for a point inby the first station, one of the two readings would appear to be incorrect and to exceed a reasonable tolerance for error.

Movement of a trip or the opening or closing of a door may have reduced resistance and accounted for the difference. If the larger figure is for a point inby, leakage or a diversion of a small scale of air for ventilation may explain the decrease in air flow from 33,600 to 28,000 cu.ft. per minute.

Two Fans in Series

Q.—Is it good policy to have two fans installed in tandem on the same air split, one a blower and the other an exhaust fan? In what proportion will the power have to be increased in order to double the quantity of air with such an arrangement?

A.—These two questions are interrelated and must be answered together. To double the quantity of air without increasing the size of the airway will demand about eight times the power, provided there is no leakage. Whether two fans, or only one be employed, the result will be the same from a power standpoint, but only provided there is no leakage along the line. If the air from one of the fans loops and returns toward the other, so that the two fans are close together, as in illustration, sketch (b), as much more air will leak and have to be handled as if there were only one big fan, as in illustration, sketch (a), for the pressure from one fan will be added to the depression created by the other. But if the air does not circulate but travels in a straight line, there will be no leakage.

Apparently, from the question, the fans, being on one split, are underground, so the advantage of having one or both on the surface does not enter into the problem. It is not well to have fans below ground unless standby fans are ready to restore ventilation as soon as such restoration is desirable.

* Continued from p. 64, *Coal Age*, November, 1941.

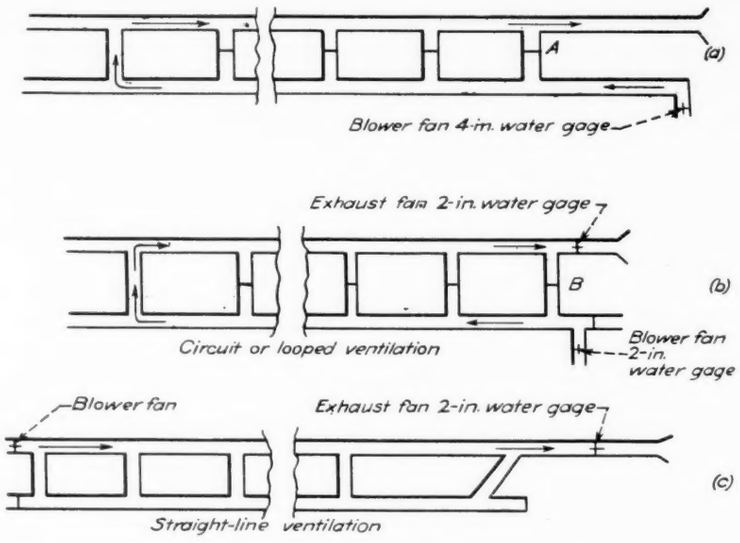

Fig. 1—(a) Fan gives 4-in. water gage at A; (b) two fans together give 4 in. and therefore equal loss of air as with (a); and (c) shows an arrangement with fans at both ends. There is no leakage here because all the air is going in one direction. With the arrangement shown in (c) the other heading can be used for ventilation with great advantage, as two headings will carry four times as much air as one at the same pressure and the original volume of air can be carried at one-eighth of the power and without loss from leakage between the headings.

HERE'S a way to put your mine in better shape for increased output in 1942—with *present* machines and equipment: Call in a Gulf engineer and let him work with your operating men to improve lubrication practice. For the proper application of the right lubricants is a vital requirement for maximum production—it helps to insure full capacity performance from machines — and freedom from breakdowns and mechanical troubles.

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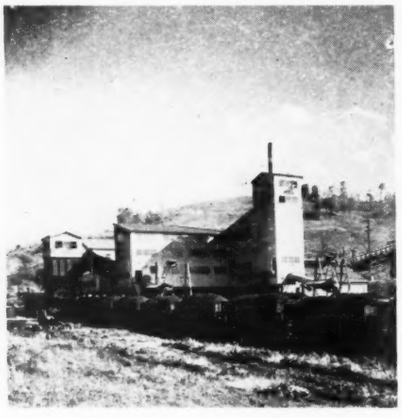
WHAT'S NEW IN OPERATING IDEAS

Book Schedule Aids Maintenance At New Owings No. 32 Plant

Provisions for proper maintenance were anything but overlooked in getting the new No. 32 "Float Kleen" preparation plant of the Consolidation Coal Co., Owings, W. Va., in operation. This plant is the subject of the feature article starting on p. 45 of this issue.

For maintenance purposes, equipment in the plant is divided into units, each consisting of a motor or motors and the equipment which it drives. This is supplemented by a schedule of inspection, lubrication and maintenance posted in a book in the maintenance foreman's office. By reference to the book, the tipple maintenance crew can tell at any time just what units should be gone over, and by looking ahead in the book to see what is coming up can make plans for any future work called for in the schedule.



A regular schedule of inspection, lubrication and maintenance, based on a book record, has been set up for this new preparation plant at Owings, W. Va.

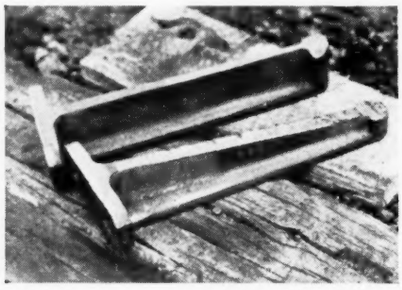
When the work is done, the corresponding item in the book is initialled by the man in charge. This system insures that all items of equipment get attention as needed at the necessary regular intervals.

•

Breakage of Flights on Loaders Prevented by Trimming Tops

Trimming the tops as shown in the accompanying illustration has almost entirely eliminated conveyor-flight breakage on three Joy 14-BU loading machines at the Cadogan (Pa.) mine of the Allegheny River Mining Co., reports James Thompson, superintendent. "We operate in the Kittanning seam, averaging 38 in. in thickness under the bony," Mr. Thompson states. "This bony is burned tightly to the roof in places and cannot be shot down with the coal, which condition, of course, forces our 14-BU's to operate with the very minimum of height while loading into shuttle cars. The seam contains a large number of sulphur bands anywhere from 1 to 3 in. thick. These bands are very hard and until recently were the cause of much flight breakage due to their penchant for getting between the flights and the top in low places.

"The standard conveyor flights are approximately 2 in. high all the way from one to the other. Breakage always occurred near the point where they are attached to the conveyor chain, so we hit on the idea of trimming the top with a torch so that the flights taper from normal height at the chain end to 1 in. less than normal height at the outside end. This does not weaken the flight at the point where strength is needed but



Tapered flight is here compared with a standard unit.

enables it to slide more readily under sulphur flakes that temporarily lodge between the roof and the rear conveyor, or else roll them into position so that they will pass on before breakage occurs.

"Under our conditions, the capacity of the loading machines has not been noticeably affected by the operation, but there has been a material reduction in bending and breakage of flights. In fact, flight breakage has been almost entirely eliminated by this procedure, which has been proved by several months of experience."

•

Hand-Powered Scooter Eases Travel in Low Coal

A hand-powered scooter for track travel in low coal won a $2.50 prize for Peter Troske, Pocahontas Fuel Co., Jenkinjones, W. Va., in the "Gadget Contest" at the Southern Appalachian Industrial Exhibition, held at Bluefield, W. Va., in August. In the accompanying illustration, in which Charles R. Wilson, Stone, Ky., is acting as demonstrator, the left hand grasps a handle attached to a rope. Pulling on the handle rotates the rear wheel. A spring and ratchet mechanism rewinds the rope for the next pull. The outrigger carrying the third, or balancing, wheel is detachable and folds neatly onto the side of the scooter when it

Demonstrating the scooter.

is carried or stored out of the way. A shelf and wire loop behind the seat permit carrying a dinner bucket. A brake completes the scooter equipment.

•

Rinsing Lamp Batteries Suggested To Prevent Electrolyte Damage

"Although the following idea is not a cost cutter as far as production is concerned," writes J. E. Matheny, mine inspector, Logan, Ohio, "it will prove worth while to miners using electric cap lamps and having trouble with the electrolyte destroying their clothing.

"If the miner, after receiving the lamp from the rack, will hold it under a faucet in the bathhouse for a few seconds any overflowed electrolyte will be washed off or diluted to a point where it will not harm the clothing. Where the lamphouse is not near the bathhouse, I would suggest that a small line be laid to the outside of the lamphouse so that a small stream of water will be available at the time the various shifts are receiving their lamps. The surplus water easily can be shaken off the batteries."

•

Air Shaft Sunk to Coal Without Hoist or Pump

Needing an air shaft, the Sunrise Coal Co., a truck operation near Cambria, Ill., cast about for some method of putting it down at as near zero cost as possible. Depth to the coal is 90 ft. The problem was solved by adopting the plan of drilling a pilot hole down to the workings, which other and larger operations have found an economical method. The 12-in. pilot hole was put down on contract by a well driller. The material then was dug or shot out and pushed down the hole to a car standing in the mine below. At intervals, a driver moved the loaded car and replaced it with an empty.

This procedure obviated the need for hoisting or pumping equipment and required only a man-operated windlass to handle sinkers and shaft-lining material.

FAST SERVICE AS USUAL, ON THESE MORROW STANDARDIZED TIPPLE AND SCREENING UNITS

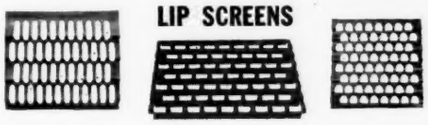
MORROW STANDARD PICKING TABLES

Assure uniform conveyance of coal and sufficient spread to reveal all impurities. Available in a full range of sizes for all tonnage requirements either with integral steel frame, making a self-contained unit, or for assembly in your own wooden frame.

RETAIL SCREENING UNIT

This 50 T.P.H. Screening Unit is designed specially for retail coal yards and small truck operating within this capacity.

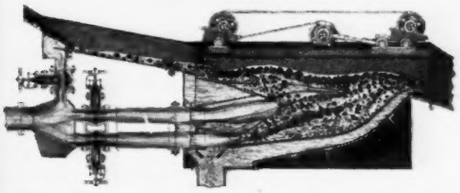
MORROW SHORT STEP FLANGED LIP SCREENS



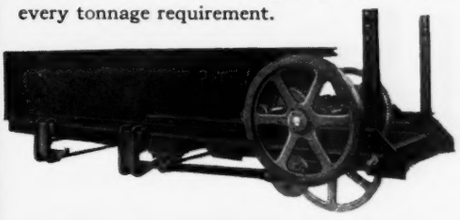
An unusually efficient type of screen for fast, accurate sizing at minimum pitch. Screen will not clog and gives excellent separation. Available in a full range of sizes and designs.

Years ago, Morrow saw the service advantages of producing a complete line of tipple, screening and preparation equipment in a full range of *standardized* sizes for every capacity operation. TODAY this foresight assures you of unusually prompt delivery on Morrow Equipment because your orders for *standard* patterns and sizes go *right into the shop* for production . . . skirting our overloaded engineering department. MORROW Standardized products are so diversified that we can fill most of your tipple, screening or coal preparation requirements with exceptional promptness even under today's conditions. CHECK your needs against the list of Morrow Standardized Products now . . . for delivery. NOW!

THE MORROW-PRINS MULTI-FLOW COAL WASHER



Combines the desirable features of trough washer with the efficiency of the pulsating jig type. Completely cleans and separates 75 tons of coal per hour per foot of width on ⅓ to ¼ horse power per ton of coal cleaned per hour. Available in a full range of sizes to meet every tonnage requirement.

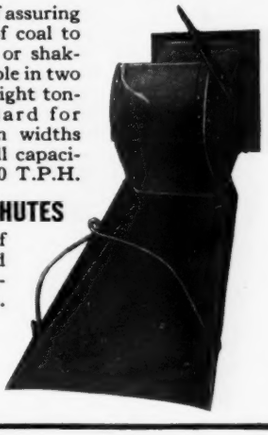


MORROW STANDARD APRON FEEDER

A positive means of assuring uniform delivery of coal to the picking tables or shaking screens. Available in two types, Junior, for light tonnage and Standard for heavier tonnage in widths to accommodate all capacities from 60 to 350 T.P.H.

BIN GATES AND CHUTES

Wide range of Standard sizes and types for every application.



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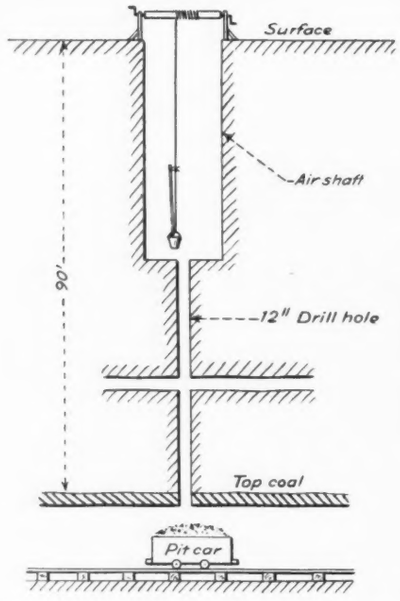
Car Hauls, Picking Tables
Loading Booms, Loading Chutes
Bins, Bin Gates

COMPLETE COAL TIPPLES AND COAL HANDLING EQUIPMENT

Elevating and Conveying Machinery
Sand and Gravel Screening and Washing Machinery

Car Retarders
Settling Tank, Grizzlies
Revolving Screens
Perforated Metal Screens
Flanged Lip Screen Plates



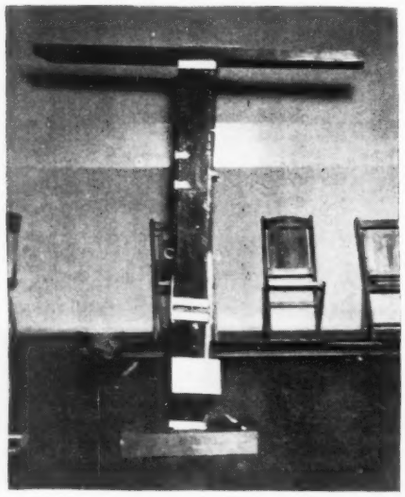
Diagrammatic sketch showing sinking with pilot hole.

Water, of which there was very little, drained to the workings and was handled by the mine pump. Excavated material was hoisted up the main slope by the coal hoist and dumped on the surface.

•

Mine Safety Post Includes Warning Signals

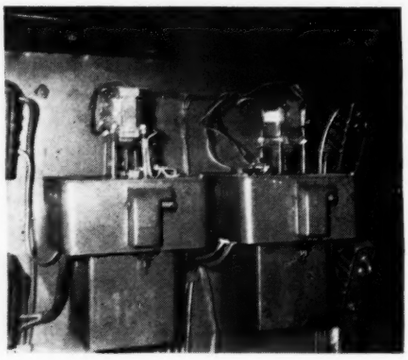
A two-piece box post containing a battery, bell and signal light, with provisions for an operating contact when the post is compressed against an internal spring which normally holds the top and bottom sections a fraction of an inch apart, won a $15 prize for Frank Hill, Charleston, W. Va., in the "Gadget Contest" held in connection with the Southern Appalachian Industrial Exhibition at Bluefield, W. Va., in August. This safety and warning post reflects Mr. Hill's conviction that a miner should have an automatic device in his place to give visual and audible warning of roof subsidence.



This safety post warns of roof movement.

Safety and Efficiency Promoted By Solenoid on Oil Switch

Chief electricians get gray hairs trying to educate equipment operators to open and close electric switches with a quick decisive throw instead of a slow teasing motion which burns the contacts. Safer operation, remote control when desired, and elimination of burned contacts on 2,300-volt Type FK20 oil switches were achieved at approximately $25 per switch at a Southern mine.



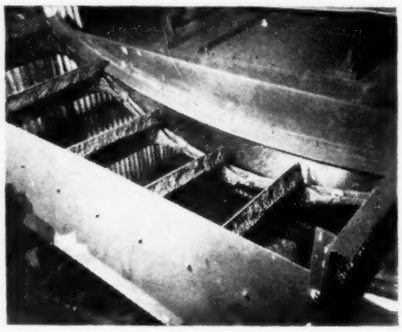
Showing how these manual switches were converted to pushbutton operation.

Switch operation is accomplished through solenoids, which appear on the top covers of the switches in the accompanying illustration. These a.c. solenoids (G.E. Type CR–9503-206A) have a pull of 22.7 lb. at 85 per cent voltage and 30 lb. at 100 per cent. The stroke is $1\frac{3}{4}$ in.; shipping weight, 10 lb. New plate-steel switch covers were made to support the solenoids.

•

Fiddling With Take-Ups Reduced By Helping Conveyors Do Job

To prevent constant adjustment of take-ups and insure better operation, provisions were made in the design of the new No. 32 "Float Kleen" preparation plant of the Consolidation Coal Co., Owings, W. Va., to enable the conveyors themselves to handle minor deviations from normal. The idea, as shown in the accompanying illustration, is to cut a section of bottom and track out of the return, allowing a section of the conveyor to sag down into the gap. The weight of this sagging portion is sufficient to compensate automatically for minor changes in length.



Showing section cut out of conveyor to permit chain to sag and thus reduce take-up adjustments.

Now's the Time!

Have you an idea which has prevented a production tie-up, lengthened the life of a piece of equipment, eliminated a hazard or otherwise promoted efficient or safe operation in or around your mine? If your answer is yes, here is the place for it and now is the time to send it in. Just a simple, concise statement of the problem and how it was solved is all that is required, along with a sketch or photo if it will help to make it clearer for the operating, electrical, mechanical or safety men who might be interested. We handle the rest. And for each acceptable idea we pay $5 or more on publication.

Rock Dust at Repair Jobs Reduces Spark Menace

Bags or cans of rock dust planted generously in preparation plants and conveyor galleries, at coal handling or hoisting points and in shops or other places where repair work or construction is going on have proved an excellent protection against fires set by sparks from arc welders or gas torches. Rock dust is especially effective against a grease or oil fire, which usually is the type—at the beginning at least—set off by a welding or cutting job.

The danger from arc welders or torches is indicated to a very limited extent only in the news reports on disastrous fires started in that fashion. Seldom publicized are the numerous incipient fires started by welding or cutting and extinguished only in the nick of time. Cases are known of fires being discovered as long as two hours after a welding job, which in all probability was the cause. The sparks had fallen into a nest of combustibles and the faint smoldering finally grew into an open flame.

Steel pans or plates to catch sparks and deflect them from dangerous places is a precaution rather generally adopted in preparation plants. The additional safeguards of plenty of rock dust within reach and, in certain hazardous places, a watchman posted at the spot for two or three hours after a job is completed, certainly are fully warranted, particularly at a time when loss of equipment is especially calamitous from the standpoints of lost production and time required for replacement. But personal injury or loss of life remains the first consideration.

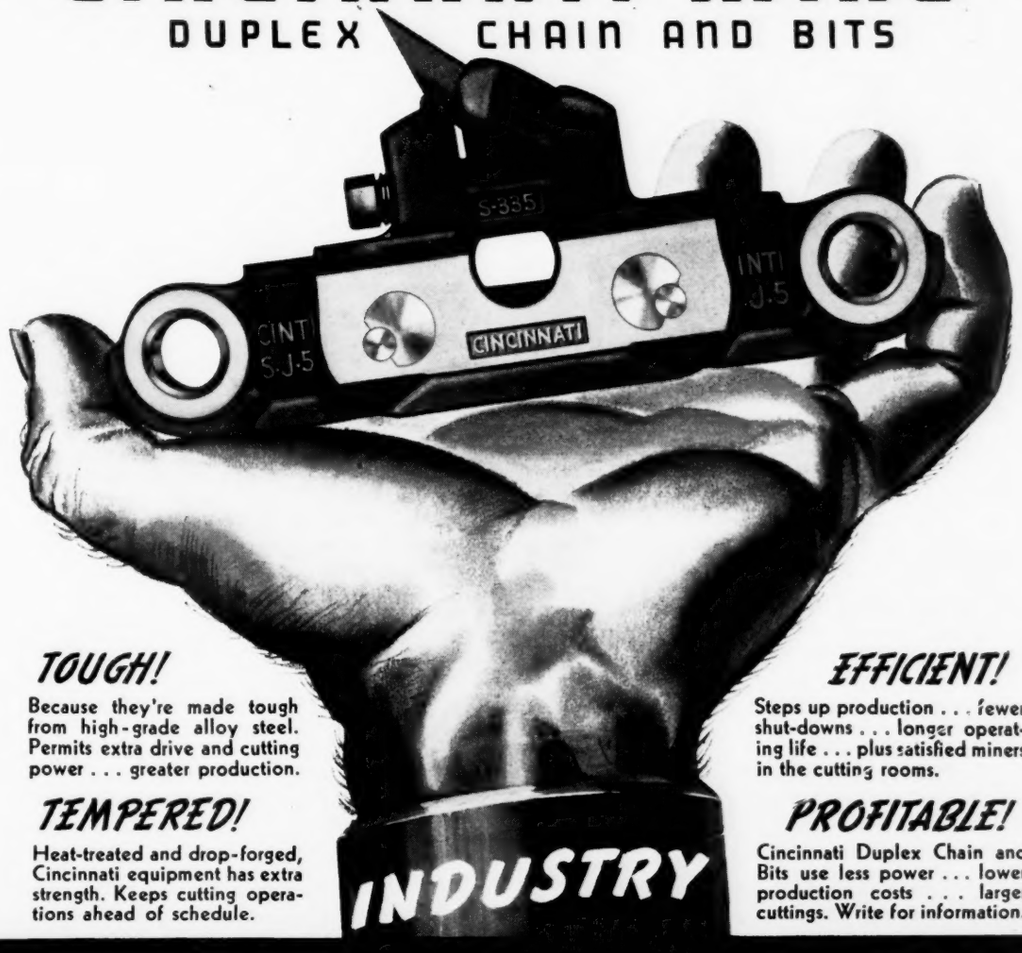
•

With Two Single Sheaves Pull Is Quadrupled

In moving heavy machinery in and about the mines, the method of rigging a 4-to-1 tackle using only two single sheaves, as shown in the accompanying illustration, may be found helpful. In this arrangement, the tree or other anchor must provide sufficient friction so that the rope will not slip around it. If necessary, two or three turns may be taken to prevent slippage. More turns than needed, however, are a considerable disadvantage in that extra labor is involved when taking a new hitch; that is, moving the free block toward the load.

With this tackle, the load moves one-fourth the distance the rope is pulled and, were it not for rope and sheave friction, the

MAKE YOUR FIRST LINE
"CINCINNATI MINE"
DUPLEX CHAIN AND BITS



TOUGH!
Because they're made tough from high-grade alloy steel. Permits extra drive and cutting power . . . greater production.

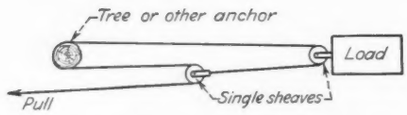
TEMPERED!
Heat-treated and drop-forged, Cincinnati equipment has extra strength. Keeps cutting operations ahead of schedule.

EFFICIENT!
Steps up production . . . fewer shut-downs . . . longer operating life . . . plus satisfied miners in the cutting rooms.

PROFITABLE!
Cincinnati Duplex Chain and Bits use less power . . . lower production costs . . . larger cuttings. Write for information.

INDUSTRY

THE CINCINNATI MINE MACHINERY CO.
2988 SPRING GROVE AVE. CINCINNATI, OHIO



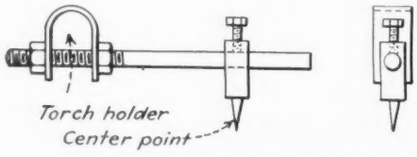
The pull is quadrupled although only two sheaves are used.

pull would be multiplied by four. Under ordinary conditions, a load pull of 3 to 3¼ times the rope pull may be expected. A specific example of the use of the two-sheave 4-to-1 rope hook-up is mentioned by W. G. Swart, mining engineer, in a recent issue of *Engineering and Mining Journal*. He tells of using it to pull a mining dredge boat over a paved highway and mentioned that the hook-up is known as the "woodman's luff."

•

Gage for Circle Cutting With Gas Torch

Stating that it "doesn't cost a fortune," Paul A. Bush, Huntington Park, Calif., contributed the accompanying sketch of a gage



Gage for circle cutting with gas torch.

for holding a cutting torch to a recent issue of the Lincoln *Stabilizer*. It is "very good for cutting circles," Mr. Bush says.

•

Truck for Hoisting Loader Head Saves $8.50 Each Trip to Top

"In order to rebuild a 5-BU loader head," writes Ernest Prudent, chief electrician, Zeigler No. 1 mine, Bell & Zoller Coal & Mining Co., Zeigler, Ill., "it is necessary that we bring it up to our surface shop. As these loader heads are 73 in. wide and the cage in our material shaft is but 70 in. wide, they could not be transported up and down the shaft unless they were swung under the cage. To do this requires the labor of four men for 2½ hours at a cost of approximately $8.50. In addition to the actual cost of the labor directly involved, the material shaft is tied up for the length of time it takes to lower or raise the head (2½ hours).

"By using the truck shown in the accompanying illustration, which supports the head at an angle, these heads are transported in the material shaft as easily and swiftly as any other material that is sent below. No labor other than that usually on the job at the material shaft is required.

"The following figures show the cost of the 5-BU loader-head truck:

New 6x6-in. angle	$16.80
Scrap plates, bars and angles; acetylene and oxygen	4.50
Wheels, axles and boxing from scrap yard	28.00
3/16-in. welding rod	9.00
Labor (12 man-shifts @ $7 per shift)	84.00
Ten per cent of actual cost allowed for overhead	14.23
Total cost of truck	$156.53

"This truck has been in service 12 years and has made 101 trips. As we have estimated that without it the company would have paid $8.50 per trip for the labor directly involved, the truck has made possible a total saving of $858 in labor. Over a period of 12 years the company has realized a net saving of $701.47."

•

Bevel Cutting with Gas Torch Requires More Preheat

More preheating is required in bevel cutting with the oxyacetylene torch than in vertical cutting because the blowpipe is at an angle to the plate surface, declares a recent issue of *Oxy-Acetylene Tips*. "Because of this, the heat tends to 'bounce off' and does not penetrate to the same extent as when the preheat flames strike the plate at right angles. The flatter the angle, the greater the amount of preheat required.

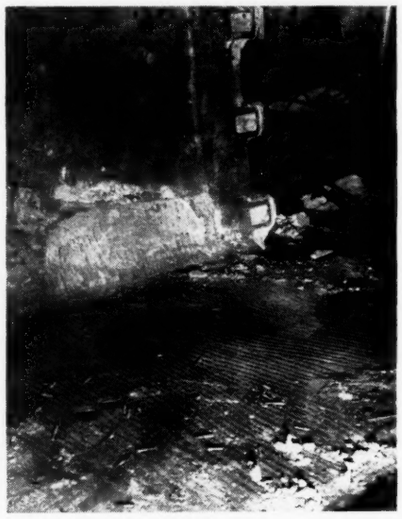
"There are a number of ways to obtain more heat. For normal beveling up to angles of 45 deg., sufficient preheat can be obtained with standard nozzles by slightly 'forcing' the preheat flames as the angle of bevel increases. For very shallow angles it sometimes is necessary to provide supplementary preheat, either with a second blowpipe or by first going over the line of cut with the cutting blowpipe. A size larger nozzle or slightly slower cuttings speeds also are of help sometimes. . . . When selecting the correct size of nozzle for use, the depth of the actual cut should be considered rather than the thickness of the plate."

•

Ridges to Catch Material Lengthen Bucket Life

Utilization to a certain extent of the overburden material itself as a wearing surface for a 9½-cu.yd. alloy-steel dragline bucket is a maintenance trick at a southern mine working in soft material. When the wearing surfaces inside the bucket are built up by arc welding, the ridges formed by the weld beads, on ¾-in. centers, are left in place. In service, clay with some sand packs in and stays between the ridges and thus takes some of the wear.

The front corner of the extra bucket, as it lay on its side in the shop for welding, is shown in the accompanying illustration. The



Ridges are left by making the beads on ¾-in. centers.

building-up process has been completed and the ridges made by the use of "Brazenweld." Past performance has indicated that the surface would wear as fast or faster if the additional time and expense of adding beads between the ridges to make a fairly smooth surface were incurred.

•

Light Warning Sign Designed For Clamping on Rail

The light warning sign shown in the accompanying illustration and designed for clamping on track rails is submitted by P. C. Ziemke, Milwaukee, Wis. Although Mr. Ziemke's accompanying comments dealt with protection of powder cars on sidings prior to unloading, such signs obviously can be made to carry other warning or safety messages.

The standard is made of ⅛x2-in. strap iron or steel, with the lower two "crow's feet" forged to fit the size of rail in question. A bolt toward the upper end keeps the two members in place, while a sliding clamp fits snugly about half way down the legs when

Truck with loader head in place ready to go on the cage.

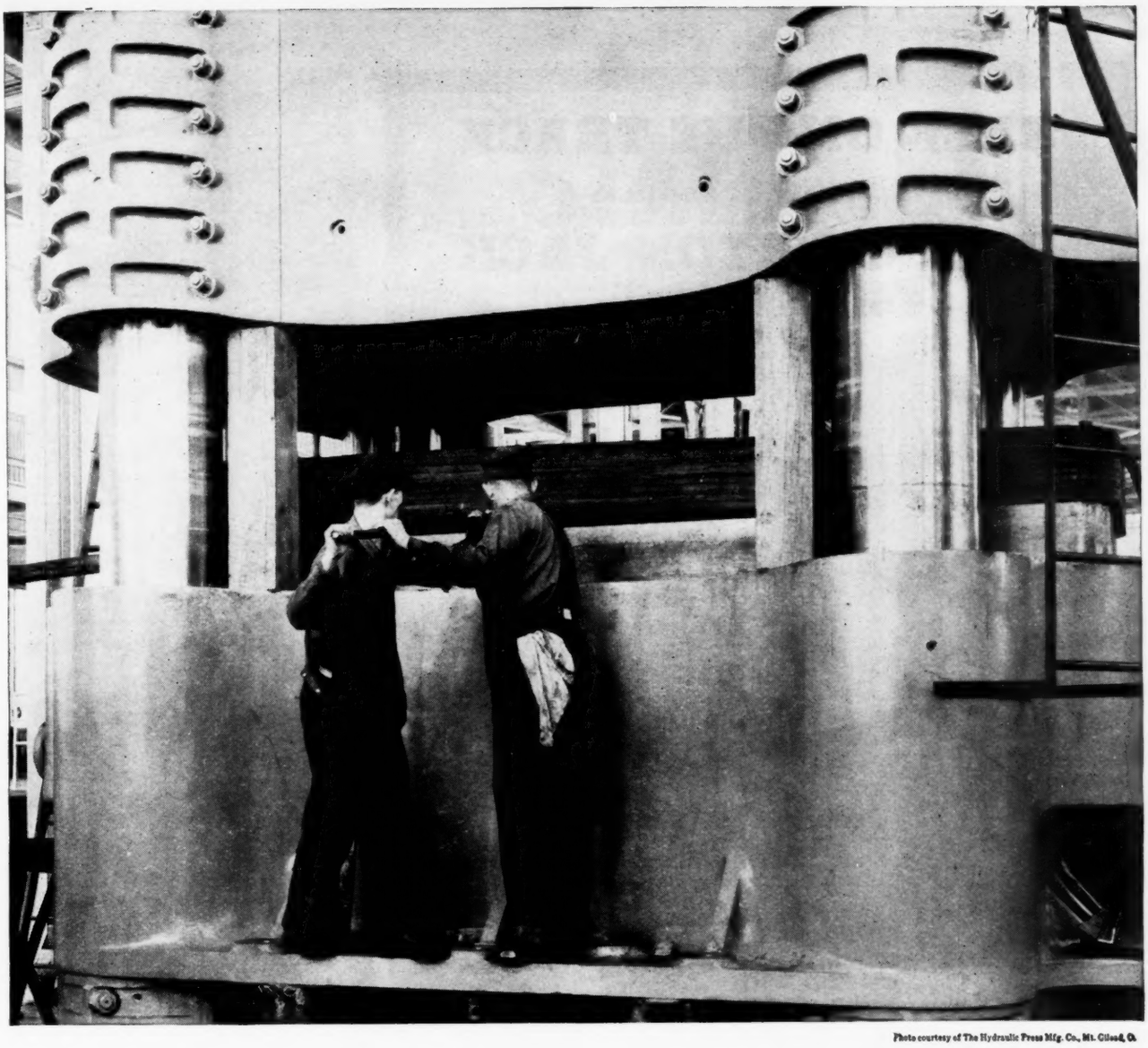


Photo courtesy of The Hydraulic Press Mfg. Co., Mt. Gilead, O.

5000-ton jaws can't chew this rubber

A typical example of Goodrich improvement in rubber

It's rubber that feels like rock—but flows like jelly. It must stand a squeeze of five thousand tons. It must be so elastic it pushes back against this pressure like a spring. Press manufacturers needed such rubber for a new, faster method of making some of the 35,000 metal parts for airplanes being rushed out today.

When the iron jaws of the press close, the push behind them equals the weight of a 15-story building. Dies with sheet metal over them are squeezed down into the rubber block. The rubber is so firm that it feels solid and hard, and so strong that it forces the sheet metal around the dies, into their exact shape.

It must stand this not only once but again and again, day after day, without being chewed to pieces — a different type of rubber from any ever made before. Could such rubber be furnished?

B. F. Goodrich not only worked out the proper type of compound but several different variations of it to adapt it to the special problems of different press manufacturers. It's one more contribution to faster production but it's still not unusual, for Goodrich improvement in rubber is a steady process applied *continuously,* year after year, to all sorts of products. Not only new products but the rubber hose, V-belts, conveyor belts and hundreds of other things you buy from B. F. Goodrich *today* can be expected to be better than those you bought even last year, because of this never-ending program of research. *The B. F. Goodrich Company, Mechanical Goods Division, Akron, Ohio.*

B.F. Goodrich

First IN RUBBER

(Another story of Goodrich development work appears on page 1)

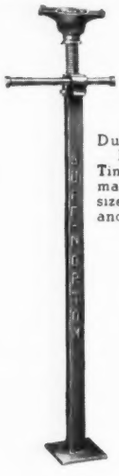
BACK ON THE TRACK

in a Jiffy . . . with a

DUFF-NORTON JACK

on the JOB!

The handy Chain Jack finds hundreds of jobs for its top lift, foot lift, hook lift and chain lift.



Duff-Norton Roof and Timber Jacks made in many sizes, are light and strong.

Automatic Lowering Jack, ideal for low loads in cramped quarters: as well as normal loads. Sizes 5 to 20 tons.

For the small investment required, an adequate stock of Duff-Norton Mining Jacks pays big dividends! Derailed cars and locomotives are back in service in a jiffy . . . timbers are hoisted . . . roofs braced . . . a hundred-and-one jobs, above ground and below, are handled quickly, easily, economically by efficient, dependable Duff-Norton Jacks.

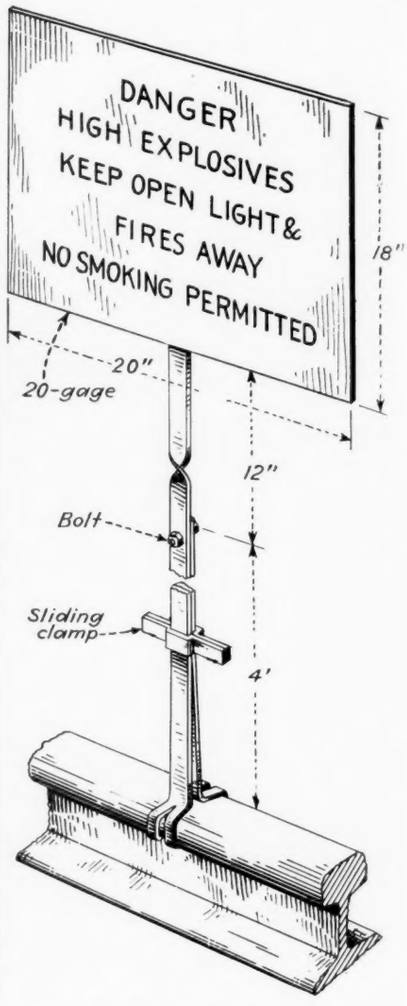
Let an experienced Duff-Norton Jack man help you check your stock, to see that your production won't suffer through a lack of Jacks.

THE DUFF-NORTON MANUFACTURING CO.

"The House that Jacks Built"

PITTSBURGH, PA.

CANADIAN PLANT **COATICOOK, QUEBEC**



Details of sign construction.

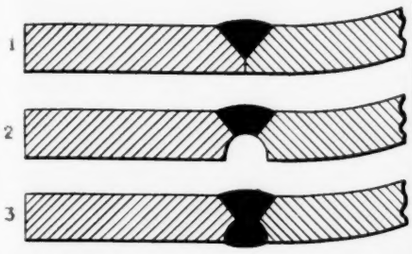
the sign is set up on the rail. This clamp may be made of ½-in. cold-rolled round stock with 8-in. handles for easy movement.

Giving the standard members a quarter turn above the bolt puts the sign at right angles to the track. The sign may be round, square or octagonal, as desired, and the lettering is optional. "Our signs, when not in use, are inclosed in plywood cases (the sign portion) and hung up under cover to prolong their usefulness.

Joint Preparation for Welding Improved by Gouging

"Flame gouging, the relatively recent development of cutting for the controlled removal of a strip of surface metal, provides an efficient means of preparing plate edges for welding," says *Oxy-Acetylene Tips*, "especially in instances where the abutting edges of the plates to be welded already are in position." In this operation, a groove is cut, or "gouged," on the back side of the joint, after the front has been welded, for a backing-up weld. The sequence of initial weld, gouging and backing-up weld is shown in the accompanying sketch.

"The convenience of gouging is apparent from the fact that the operator needs only a regular hand-cutting blowpipe equipped



Showing the sequence in making the backing-up weld: (1) edges provided with a bevel and nose are welded on the front side; (2) a groove is gouged on the back side; (3) the backing up weld is made.

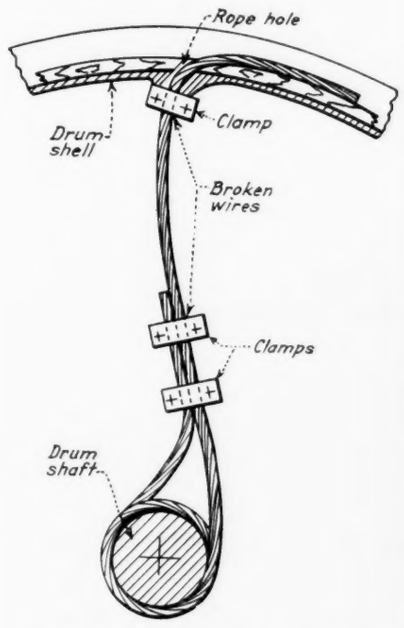
with the correct gouging nozzle to cut a groove to the desired width and depth. By taking care to extend the groove to sound weld metal, full weld penetration of the backing-up weld is readily obtained."

•

Clamping Rope Inside Drum Reduces Breakage

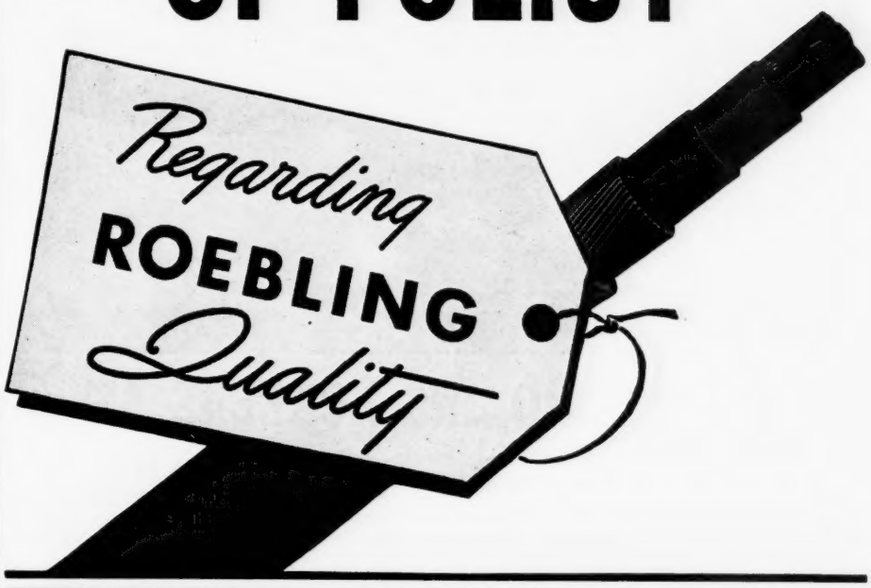
In three instances of complete and two of partial failures of hoisting ropes investigated by the British Safety in Mines Research Board and reported by A. E. McClelland in a recent issue of *The Iron and Coal Trades Review*, it was found that the rope wires had broken in fatigue as a result of reverse bending at the edges of the clamps, as shown diagrammatically in the accompanying illustration. None of the ropes had been supported between the rope hole and the drum shaft by being clamped to a spoke or other part of the drum, the clamps being merely fixed to the rope.

Failure was due to flapping of the somewhat slack rope with each half revolution of the drum. Such failures may be avoided, it was stated, by clamping the rope to the drum spoke at several points between rope hole and shaft, or by another suitable method of preventing flapping of the rope.



Showing condition resulting in rope failure.

A STATEMENT OF POLICY



ELECTRICAL wires and cables—supplies and equipment of every sort—are so desperately needed for National Defense that the temptation to speed production by lowering quality is ever-present.

We want to assure you that no such expedient will be entertained by Roebling. There will be no cutting of quality-corners for time-saving purposes. It is the definite Roebling policy to maintain the high quality of Roebling electrical wires and cables . . . despite the pressure for "speed at any cost".

Roebling believes that in upholding the high quality of these products, safe, uninterrupted service is assured—saving time and costly interruptions *in the long run.*

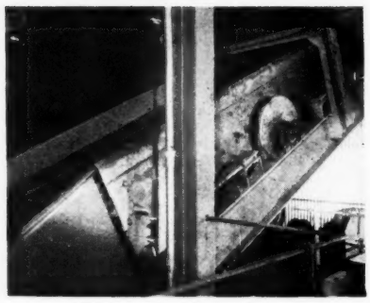
JOHN A. ROEBLING'S SONS COMPANY
TRENTON, NEW JERSEY

ROEBLING 1841 1941 100th ANNIVERSARY

ROEBLING
ELECTRICAL
WIRES AND CABLES

11 ROBINS SCREENS AT *Consolidation #32*

To more than meet today's demands for sharply controlled, uniform products, Consolidation Coal Company spared no expense when building their brand new 5,000 tons-per-day preparation plant at Owings, West Virginia. The selection of Robins Vibrating Screens for this ultra-modern "Coal Factory" is significant. Leading producers, like Consolidation, admire the efficiency and rugged construction of Robins equipment. They know they can rely on the prompt assistance that is always available from Robins' experienced Engineers.

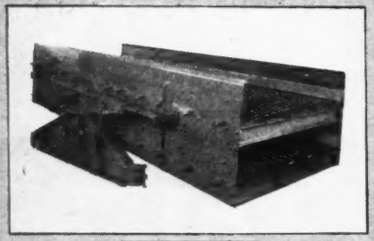


Double Deck 60"-144" Style C900 Robins GYREX Screen removing fines ahead of the Chance Cleaning Cone.

When you deal with Robins, it doesn't matter whether you're a large or small operator. It makes no difference whether you want a complete tipple or a replacement item. Your inquiry gets careful, speedy attention in all cases.

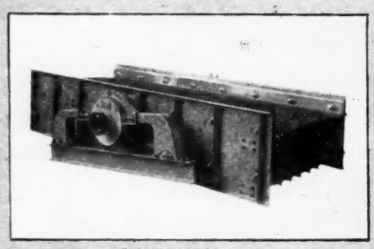
Robins equipment includes Belt Conveyors, Idlers, Sectional Mine Conveyors, Chain Conveyors, Bucket Elevators, Loading Booms, Picking Tables, Vibrating Chutes, Shaker Screens, Screen Cloth, Crushers, Feeders, Stackers, Grab Buckets, Car Dumpers, Car Hauls and Retarders. A Robins office is in your vicinity.

THERE'S A ROBINS VIBRATING SCREEN FOR EVERY REQUIREMENT!



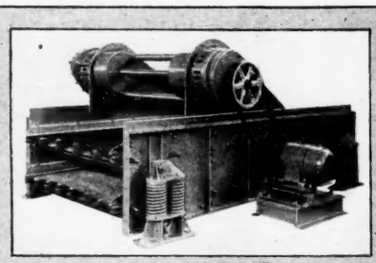
ROBINS GYREX

Positive stroke screen for handling heavy tonnages. The GYREX is particularly suited for scalping and preparing finished sizes in the coarser range, including Lump.



ROBINS VIBREX

A light high speed vibrator for rescreening, dedusting and sizing Nut, Stoker, Pea and other small sizes.



ROBINS ELIPTEX

Designed for horizontal mounting, ELIPTEX Screens convey the oversize across the deck with no loss in height. Ideally suited for installations where headroom is limited, and for washing and dewatering.

ROBINS CONVEYING BELT COMPANY

• PASSAIC, NEW JERSEY AND PRINCIPAL CITIES •

WHAT'S NEW IN THE FIELD

Lewis Accepts Roosevelt Arbitration Plan Ending Captive-Mine Walkout

WASHINGTON, D. C., Dec. 1—A five-day suspension in captive coal mines came to an unexpected end on Nov. 22 when John L. Lewis, president, United Mine Workers, accepted the proposal of President Roosevelt for arbitration of the union shop issue. In a letter to Mr. Lewis the President named as arbitrators Dr. John R. Steelman, director, U. S. Conciliation Service, representing the public; Benjamin F. Fairless, president, United States Steel Corporation, for the steel companies owning the mines, and John L. Lewis, for the miners. The President previously had declared that "the Government of the United States will not order, nor will Congress pass legislation ordering a so-called closed shop." Dr. Steelman is relinquishing temporarily his post as conciliation director and will function in this case only as public representative, but his vote will be decisive.

Meeting yesterday at Uniontown, Pa., to act on the Lewis decision, delegates representing 20,000 captive mine workers in Greene and Fayette counties voted unanimously to back the union leader in accepting President Roosevelt's proposal. With this action the suspension was called off, the men returning to work Nov. 24.

Suggested Two Solutions

President Roosevelt's letter to Mr. Lewis read as follows:

"On Nov. 18 I addressed a letter to the several steel companies and to the United Mine Workers, parties to the dispute in regard to the captive mines.

"In the public interest I suggested two possible solutions to that dispute. Proposal (B) of that letter was as follows: 'Submit this point to arbitration, agreeing in advance to accept the decision so made for the period of the national emergency without prejudice to your rights in the future.'

"Since that time the steel companies have advised me of their acceptance of my proposal (B), and you have advised me that the matter would be considered by your national policy committee today.

"In completion of this arrangement, I am appointing today a board of three members consisting of Dr. John R. Steelman, as the public representative; Mr. Benjamin Fairless, representative of the steel industry, and Mr. John L. Lewis, representing the mine workers.

"Dr. Steelman possesses the qualifications essential to the task of public representative and is of unquestioned integrity. Messrs. Fairless and Lewis rate as experts in their field, and are competent to represent their respective viewpoints of this controversy. I am suggesting that this board begin its work immediately and remain in continuous session until this task is completed."

Mr. Lewis' reply was:

"The national policy committee of the United Mine Workers considered today your letter of this date supplemental of your previous letter of Nov. 18.

"By unanimous vote this committee accepts your proposal to submit the captive mine controversy to a board consisting of Dr. John R. Steelman, representing the public, and Messrs. Benjamin F. Fairless and John L. Lewis, representing the steel companies and the United Mine Workers, respectively.

"In consideration of the arrangement, which we accept in the public interest, the national policy committee is recommending an immediate return to work of all mine workers employed in the captive and commercial mines, wherever situated."

The suspension was foreshadowed when Philip Murray, vice president of the miners' union as well as president of C.I.O., and Thomas Kennedy, secretary-treasurer, U.M.W., resigned from the National Defense Mediation Board on Nov. 11 following rejection by a 9-to-2 vote by the Board of the demand for a union shop. At the same time it was made known that five alternates representing C.I.O. on the Board were to resign, Messrs. Murray and Kennedy declaring that the decision had "made it impossible for labor to retain any confidence in its future actions."

President Roosevelt then intervened, calling the union officers and steel company officials to a White House conference on Nov. 14. In opening the conference, the President emphasized that coal production must continue, but said that for the government to attempt to compel the 5 per cent of captive mine employees not members of the U.M.W. to join would be "too much like the Hitler methods toward labor." Although Mr. Lewis, flanked by Messrs. Murray and Kennedy, had his wish in conferring with major company officials—Messrs. Eugene G. Grace, president, Bethlehem Steel Corporation; Frank Purnell, president, Youngstown Sheet & Tube Co., and Mr. Fairless—instead of so-called second stringers, no conclusion satisfactory to either side was reached after meetings on Nov. 14, 15 and 16.

With anti-strike legislation and preparations by the army to take over the mines looming ominously, U.M.W. officials ignored what President Roosevelt called an "indisputable obligation" to continue coal production necessary for national defense by giving the order to union men in the captive mines to cease work Nov. 15. As a result, production was practically at a standstill on Monday, Nov. 17. Sympathy strikes quickly spread to commercial operations, with shooting affrays resulting in the wounding of twelve men occurring in western Pennsylvania. Most of the men hit were

World Wide Photo

Peace talks opened as members of the arbitration board created by President Roosevelt met Nov. 26 at the Hotel Commodore, New York City, to seek a settlement of the captive coal-mine dispute. Left to right: Benjamin F. Fairless, president, United States Steel Corporation; Dr. John R. Steelman, chairman, representing the public, and John L. Lewis, president, United Mine Workers.

pickets. By Nov. 21 these strikes had spread to mines in Pennsylvania, West Virginia, Maryland, Kentucky and Ohio.

The contrast in outlook within two days was reflected, however, in a statement yesterday by Mr. Lewis: "The settlement speaks for itself. The arrangement provides for an honest determination of the issue, and I might add parenthetically that it is a rather sad commentary that we have to arbitrate a decision of a so-called mediation commission. The United Mine Workers and its membership are happy to make this contribution in the public interest."

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Connally Labor Legislation Considered in Senate

Among much legislation proposed in Congress in connection with the labor situation the bill receiving most consideration, by the administration at least, is S. 2054, by Senator Connally of Texas, hearings on which began on Nov. 21. In substance it is an amendment to the Selective Service Act, paragraph 9, authorizing the President to take over, in the name of the government, any plant equipped for the manufacture, production, or mining of any article or material which may be required for the national defense or which may be useful in connection therewith.

The life of the act would be limited to the life of the emergency. The President must first find that there is an interruption of the operation of such a plant, such as strikes or other labor disturbances, or other causes, and further find that the national defense program is being unduly hampered or delayed and that the exercise of the authority granted in the bill is necessary to insure the operation of such plant in the interest of national defense. It provides that any plant which has been taken under the provisions of this law shall be returned to its owner whenever the President determines that such plant will be privately operated in a manner consistent with the needs of national defense.

It further provides that any plant taken shall be operated under the same terms and conditions of employment which were in effect at the time possession of such plant was taken. This means that the situation with respect to labor and other conditions would be frozen as of the time the plant was taken over, except it creates a defense board of three members which will be authorized to adjust wages on the basis of the cost of living, if need be, when petitioned by the employees or their representatives, and after full investigation by the board. It could also adjust wages to conform to work of like or comparable character in the industry. The board's findings would have to be approved by the President, and from that finding there is no appeal.

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Y. & O. Acquires O. & P. Properties

The Youghiogheny & Ohio Coal Co., of which W. L. Robison is president, has acquired the properties of the Ohio & Pennsylvania Coal Co., including the Nelms mine, Cadiz, Ohio, with a daily capacity of 4,000 tons. R. D. Squibb will be the new superintendent.

How to Preserve a Roof and Sleuth a Mine Fire Studied at Easton A.I.M.E. Fall Meeting

GUNITE, air conditioning and paint all in turn have been recommended for mine-roof preservation, but not until the Fifth Joint Meeting of the Coal Division, American Institute of Mining and Metallurgical Engineers, and the Fuels Division, American Society of Mechanical Engineers, at Easton, Pa., Oct. 30–Nov. 1, were there any data available to explain just what kind of protection each kind of roof needed and what caused the roof to deteriorate without it. The field is a big one and will be further explored.

Mine fires also need study and at this meeting some of the chemical aspects were explored, though the physical still remain somewhat obscure. The mechanical engineers contributed symposiums on adjustment of pulverized fuel-burning equipment and of underfeed stoker-fired units and a third on anthracite burning as pulverized coal and on an underfeed stoker.

Why Does Roof Fall Even in Narrow Places?—(1) Rises in temperature of intake air in summer, which expand rock and make it buckle; (2) deposition of moisture by air on being cooled as it enters a mine, which moisture acts chemically on lime, clay and other roof materials or physically on colloid clay bands causing them to swell; (3) alternate wetting and drying of roof, and (4) oxidation of pyrite and possibly of micaceous minerals were real or alleged reasons for roof falls, as enumerated by H. P. Greenwald, supervising engineer, experimental coal-mine section, Bureau of Mines, for Irving Hartmann and himself in an address discussing tests made to determine what effect changes of moisture and temperature have on the Pittsburgh bed and overlying strata.

Paint for the Mine Roof—Referring to the use of paint for coating mine roof, Mr. Greenwald said paint thinners are volatile and flammable, and the paint therefore should be applied only in good air currents, preferably off-shift, and also where no open lights or other possible sources of ignition are present. Once set, by evaporation of thinner, the residual material probably is not much more flammable than coal. References were made by Mr. Greenwald to *Coal Age*, May, 1937, p. 219, and May, 1941, p. 64.

Paint, added Mr. Greenwald, has been applied also with success in parts of intake headings and on return-air haulageways of three 4,000-ton-per-day coal mines to protect a gray sandy friable shale over the Illinois No. 6 bed, which in some sections has many slips and rolls. The spraying outfit at one mine cost $370 with a small compressor and driving motor. Surfaces painted must be dry and firm; broken and chipped parts must be removed and paint will furnish protection only against atmospheric action. In Table I

Table I—Expansion of Beds per Degree Fahrenheit Expressed in Percentages of Original Length

Material	Thickness, Inches	Expansion, Per Cent: In Direction of Bedding	Expansion, Per Cent: At Right Angles to Bedding
Third slate	9	0.0006	0.0011
Second slate	8	0.0006	*
Rooster coal	13	0.0019	0.0027
Roof coal	17	0.0012	0.0025
Drawslate	16	0.0005	0.0009
Pittsburgh bed	62 to 64	0.0021	0.0026

*Specimens could not be prepared at right angles to bedding planes as rock separated too readily along these planes of weakness.

Table II—Expansion and Change in Condition of Material Due to Spraying

Material	Coating	Duration of Test, Days	Maximum Expansion, Per Cent	Final Condition
At Right Angles to Bedding				
Drawslate	None	1	2.15	Disintegrated
Drawslate	Paint	3	0.24	Unchanged
Roof coal	None	4	0.11	Unchanged
Rooster bed	None	2.5	0.12	Unchanged
Rooster bed	Paint	2	0.00	Unchanged
In Direction of Bedding				
Drawslate	None	1	0.12	Disintegrated
Drawslate	Paint	3	0.04	Unchanged
Second slate	None	4	0.12	Spalled
Third slate	Paint	2	0.04	Unchanged
Third slate	Paint	2	0.00	Unchanged
Third slate	Paint	4	0.37*	Broken
Third slate	Paint	2	0.03	Unchanged
Roof coal	None	4	0.10	Cracked at slate inclusion
Rooster bed	None	2	0.00	Unchanged

*Authors think this exceptional figure "may have been due to a flaw in the painting or to poor condition of rock before painting—probably the latter."

Table III—Expansion and Change of Condition Due to Alternate Immersion and Drying

Material	Coat	Duration of Test, Days	Maximum Expansion of Coal	Change in Condition
At Right Angles to Bedding				
Drawslate	Paint	4	0.20	Badly cracked
Roof coal	None	3	0.00	None
Roof coal	Paint	3	0.00	None
Rooster bed	None	3	0.00	None
Along Bedding				
Drawslate	None	3	0.47	Disintegrated
Drawslate	Paint	3	0.00	None
Second slate	None	3	0.93	Slightly cracked
Third slate	None	0.25	0.09	Disintegrated
Third slate	Paint	4	0.02	None
Third slate	Paint	4	0.00	None
Roof coal	None	4	0.03	Cracked along slate inclusion
Rooster bed	None	3	0.00	None

Table IV—Expansion and Change of Condition Due to Immersion

Material	Coat	Expansion, Per Cent Min.	Max.
At Right Angles to Bedding			
Drawslate	None	1.3	5.9
Drawslate	Paint	2.0	6.5
Drawslate	Cement	0.3	1.2
Third slate	None	3.0	...
Third slate	Paint	2.1	4.2
Third slate	Cement	0.9	...
Pittsb'gh bed	None	0.0	...
Roof coal	None	0.2	...
Roof coal	Paint	0.1	...
Rooster bed	None	0.0	...
Along Bedding			
Drawslate	None	0.1	0.8
Drawslate	Paint	0.0	0.3
Drawslate	Cement	0.0	0.0
Second slate	None	0.0	0.1
Second slate	Paint	0.0	0.7
Third slate	None	0.3	...
Pittsb'gh bed	None	0.0	...
Roof coal	None	0.0	0.4
Rooster bed	None	0.0	0.0

the measures are listed from the mine floor up with Pittsburgh coal bed as the base and the "third slate" as the highest measure subjected to test.

Pittsburgh-bed coal and the rooster seam above it expand almost equally, and all the three slates have almost the same coefficient of expansion. The figures are a little larger than would be obtained for a narrow range of temperature, as the coefficients were determined over a range of temperature far wider than that found in coal mines. In the tests recorded in Table II the specimens were sprayed, during the day only, at intervals of about two hours, with a finely atomized water spray.

In the tests recorded in Table III, the materials were immersed in water for a half hour and then allowed to dry for two hours, except at night, when the drying continued for several hours. They were then immersed in water for two hours, and so on.

Unsaturated Air Will Dampen Coal and Rock—A number of specimens of Pittsburgh-bed coal, rooster coal and drawslate were tested in the air-conditioned cabinet at 68 to 69 deg. F. and a humidity of 63, 76 and 92-93 per cent and at 90 deg. and 93 per cent humidity. The coals showed slight loss of moisture at 68 deg. and 63 per cent humidity, and showed almost no gain or loss in weight when the humidity was raised to 76 per cent; they gained weight under the remaining two test conditions, and at the highest temperature and humidity the rooster coal made a maximum gain of 0.27 per cent.

Samples of drawslate lost as much as 0.48 per cent of weight due to loss of moisture at 68 deg. and 63 per cent humidity and up to 0.29 per cent loss at 68 deg. and 76 per cent humidity. At 69 deg. and 92 per cent humidity the slate gained in weight up to 0.49 per cent and reached 0.64 per cent at 90 deg. and 93 per cent humidity.

Specimens that were painted gained moisture much more slowly than uncoated specimens; some of the painted specimens were still gaining weight slowly at the end of 7 days. However, that increase was, in general, only 20 per cent of that registered by the untreated specimens.

The cement coatings were not of gunite density, as they were put on by placing the specimens in a mold containing a 1:2 pasty cement-sand mixture, the sides of the mold being compressed slightly, forming a $\frac{1}{8}$-in. coating all around the rock. Whether the specimen was coal or slate, the maximum

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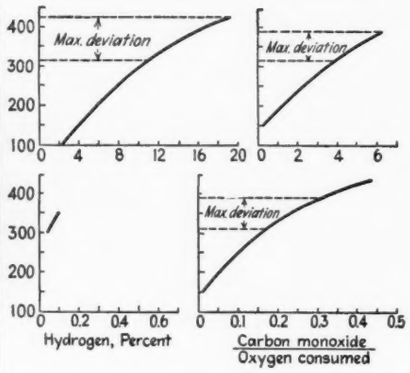

Fig. 1—Data for estimating temperature of anthracite when oxidized with air (air-and-methane free basis).

gain in weight ranged from 2.22 to 2.83 per cent. Apparently the cement, which was more porous than gunite, absorbed the moisture.

On immersing the slates and coals in water for periods up to 11 days, the slates showed signs of disintegration at the end of the first day or sooner. As in tests with high humidity, the coals absorbed much less water than the slates. Painting reduced moisture absorption somewhat and slowed disintegration, but was less beneficial than in atmospheres of high humidity.

Heat caused much expansion of Pittsburgh-bed coal and rooster coal, but moisture affected them only slightly even in immersion. At right angles to bedding, expansion from heat was 50 per cent greater than along the bed. Slates were relatively insensitive to heat but were sensitive to moisture. With thermal expansion, the swelling at right angles to bedding was twice that in the direction of the bedding. Expansion of slates from moisture is so much greater than from heat that the latter can be ignored as a cause of disintegration. Pyrite does not appear to weaken the rock by its expansion when becoming oxidized. Protective coatings of tar paints or cement-sand mixtures kept moisture from the slates and reduced expansion 75 to 95 per cent and so prevented disintegration.

A Chemist Can Determine Progress of Fire—How a chemist can tell by analysis what is happening to a sealed fire was explained by G. S. Scott, assistant chemist, explosives division, U. S. Bureau of Mines, in a paper in which G. W. Jones collaborated. Compounds having relatively high hydrogen-carbon ratios, he declared, probably are more readily attacked by oxygen than those having lower ratios of hydrogen to carbon, which agrees with the known fact that lower-rank coals containing higher hydrogen-carbon ratios than the high-rank coals are more readily oxidized than the latter.

Gases in Sealed Area Indicate Intensity of Fire—Below 400 to 500 deg. C., the oxygen consumed in oxidation forms four products: carbon dioxide, carbon monoxide, water and a solid "coal-oxygen" complex. Presence of this complex retards oxidation; hence, coal that has been thus heated and oxidized becomes less susceptible to oxidation. Above 500 deg. C., this solid coal-oxygen complex does not appear and thereafter oxidation is no longer retarded, except by reductions in the area exposed. Starting at, say, 30 deg. C., fresh coal oxidizes with liberation of heat, which establishes a draft in the pile or broken mass of coal. Oxidation accordingly increases, though the circulation thus induced will remove heat. However, when the coal-oxygen complex is formed, the rate of heating thereby is slowed.

The carbon monoxide-carbon dioxide ratio and the carbon monoxide-oxygen consumed ratios or the presence of hydrogen that does not appear either in oxidation or distillation products until 300 to 350 deg. C is reached may be used to determine the temperature of the fire.

When 545 to 660 deg. C. is reached, the carbon monoxide and hydrogen formed burn directly as gases if oxygen is present. Above this temperature, both hydrogen and carbon monoxide may approach zero. An active fire with enough secondary air would show much carbon dioxide, little carbon monoxide and no hydrogen.

Heat Crawls Toward Source of Oxygen—During the initial heating, liberated heat passes along the path of circulation, so the highest temperature is attained at the point

Keeping Step With Coal Demand

Bituminous Coal Stocks

	Thousands Net Tons Oct. 1 1941	P.C.Change From Sept. 1 1941	P.C.Change From Oct. 1 1940
Electric power utilities	11,637	+6.6	+ 2.6
Byproduct coke ovens	7,390	+2.5	—16.6
Steel and rolling mills	827	+9.2	+19.8
Railroads (Class 1)	8,758	+7.9	+54.2
Other industrials*	19,530	+8.3	+25.5
Total	48,142	+6.9	+14.3

Bituminous Coal Consumption

	Thousands Net Tons Sept. 1941	P.C.Change From Aug. 1941	P.C.Change From Sept. 1940
Electric power utilities	5,596	—0.8	+33.9
Byproduct coke ovens	6,850	—3.6	+ 3.4
Steel and rolling mills	802	—4.7	+ 6.6
Railroads (Class 1)	8,053	+0.2	+21.9
Other industrials*	10,707	—0.6	+24.1
Total	32,008	—1.2	+19.5

* Includes beehive ovens, coal-gas retorts and cement mills.

Coal Production

Bituminous

Month of October, 1941, net tons	49,800,000
P.c. increase over Oct., 1940	28.7
Jan.-Oct., 1941, net tons	411,608,000
P.c. inc. over Jan.-Oct., 1940	10.7

Anthracite

Month of October, 1941, net tons	5,382,000
P.c. increase over Oct., 1940	23.6
Jan.-Oct., 1941, net tons	46,403,000
P.c. inc. over Jan.-Oct., 1940	8.7

Sales of Domestic Coal Stokers Vs. Oil Burners

	Coal Stokers	Oil Burners
September, 1941	26,720	22,665
P.c. change from Sept., 1940	—13.8	+12.5
January-September, 1941	147,903	153,357
P.c. inc. over Jan.-Sept., 1940	+27.5	+22.4

Index of Business Activity*

Latest week	159.7
Per cent change from month ago	+ 1.3
Per cent change from year ago	+13.9

* *Business Week*, Nov. 15.

Electrical Power Outputt

Week ended Nov. 8, kw.-hr.	3,325,574,000
P.c. change from month ago	+ 0.3
P.c. change from year ago	+16.4

† Edison Electric Institute.

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where the coal leaves the pile, but as the temperature rises the quantity of oxygen in the pile gets less and less, so that finally the only place where the pile can get oxygen and so burn is at or near the point of entry. For this reason the hot spot travels to the source of oxygen supply.

Fire of spontaneous origin in British anthracites have been noted, *Coal Age*, Dec. 30, 1926, p. 913, and one of the authors familiar with data on a Pennsylvania anthracite refuse-bank fire is convinced it originated spontaneously, though such spontaneous anthracite fires appear rare in Pennsylvania. The coal-oxygen complex can be removed by distillation, but the product is carbon dioxide, whereas fresh anthracite delivers a volatile matter consisting largely of hydrogen with lesser quantities of methane and oxides of carbon. This change in the gases produced by the fire will afford the chemist a clue as to the temperature attained.

Ash Fusion Will Help in a Post Mortem—At temperatures above the carbon-monoxide inflection point, oxidation is so vigorous that the coal is thoroughly burned at the point where the oxygen first comes in contact with it, leaving distinct evidence of ash, and this ash can be used to determine whether the coal has reached a temperature above the carbon-monoxide inflection point. Other evidences of temperature visible with a hand lens are cracks in anthracites larger than 20-mesh caused by differential oxidation when anthracite is oxidized at 300 to 350 deg. C. For higher temperatures, the clinkers formed may be *post mortem* evidence that the temperature of the fire at some time has exceeded that of the minimum fusion temperature of the clinker.

More Culm Being Used—The market finds small sizes of anthracite increasingly acceptable, asserted J. H. Kerrick, combustion engineer, Philadelphia & Reading Coal & Iron Co., Philadelphia, Pa. Annual sales of No. 3 buckwheat (barley) have risen from 3,964,687 net tons in 1931 to 4,521,257 in 1940, and of No. 4 buckwheat from 505,320 net tons to 1,989,212 in the same period, due to technological advances that have, on the one hand, increased purity of product and on the other have resulted in a more efficient use of the fuel.

Maple Hill Steam Plant—In the steam plant at Maple Hill colliery, operated by the Philadelphia & Reading, are two 1,106-hp. bent water-tube Babcock & Wilcox Sterling boilers, each with 11,062 sq.ft. of heating surface and an economizer surface of 3,459 sq.ft. Each boiler will generate 120,000 lb. of steam per hour with a boiler-drum pressure of 450 lb. per square inch. The Coxe stokers on which the coal is burned with the aid of air from seven manually controlled wind-box sections are 18 ft. wide, have a grate area of 424.5 sq.ft. and burn 47.2 lb. of No. 4 buckwheat per square foot of effective grate area. Stoker speed is 40 to 80 ft. per hour.

Specifically, the fuel is between $\frac{3}{32}$ and $\frac{3}{64}$ in. round with tolerances of 10 per cent oversize and 25 per cent undersize. Ash averages 13.82 per cent and minimum ash-softening temperature is 2,600 deg. F. Generating at the mine mouth, low first cost, high capacity and reliability were larger considerations than maximum efficiency, so the plant has no preheaters or superheaters. Efficiency range is 74 to 78 per cent. Average rating on a working day is slightly over 230 per cent with swings of 100 to 400 per cent of rating. Anthracite increases in resistance to crushing as distance increases from Short Mountain colliery in the west, asserted C. H. Frick, plant betterment engineer, Pennsylvania Power & Light Co., Allentown, Pa. (see Fig. 2).

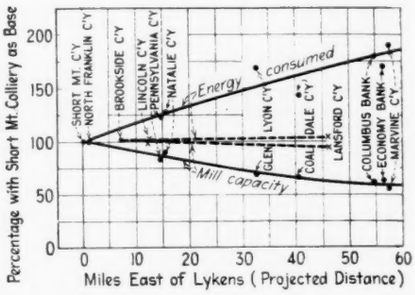

Fig. 2—Decreasing resistance to crushing as Short Mountain colliery is approached. Solid lines show tests at Lykens with screen-type ball-and-pusher mill, and broken lines denote tests at Pine Grove with ball and tube mill.

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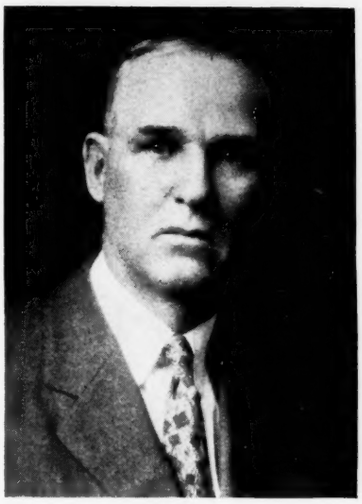
Eugene McAuliffe Named to Head A.I.M.E. for Coming Year

Eugene McAuliffe, president, Union Pacific Coal Co., Omaha, Neb., has been elected president of the American Institute of Mining and Metallurgical Engineers for 1942. The election was by letter ballot of the 11,000 members. Two vice presidents also have been elected: Chester A. Fulton, president, Southern Phosphate Corporation; and L. E. Young, consulting mining engineer, Pittsbugh, Pa. New directors named are: Charles Camsell, Deputy Minister of Mines, Dominion of Canada; C. A. Garner, vice president, Jeddo-Highland Coal Co., Jeddo, Pa.; William B. Heroy, vice president and chief geologist, Pilgrim Exploration Co.; Wilber Judson, vice president, Texas Gulf Sulphur Co.; Leo F. Reinartz, works manager, American Rolling Mill Co.; and Francis A. Thomson, president, Montana School of Mines, and director, Montana Bureau of Mines and Geology.

The new president, who will formally take

Coming Meetings

- Coal Mining Institute of America: annual meeting, Dec. 11 and 12, Fort Pitt Hotel, Pittsburgh, Pa.
- Seventh International Heating and Ventilating Exposition: under auspices of American Society of Heating and Ventilating Engineers, Jan. 26-30, 1942, Philadelphia, Pa.
- American Institute of Electrical Engineers: winter convention, Jan. 26-30, Engineering Societies Building, New York City.
- American Institute of Mining and Metallurgical Engineers: annual meeting, Feb. 9-12, Engineering Societies Building, New York City.
- American Society for Testing Materials: spring meeting, March 2-6, Cleveland, Ohio.
- American Mining Congress: coal convention and exposition, April 27-May 1, Music Hall, Cincinnati, Ohio.



Eugene McAuliffe

office at the annual meeting in the Engineering Societies Building, New York City, in February next, was born in England, brought to this country at the age of six and educated in the United States and Canada. For the first 20 years of his professional career Mr. McAuliffe was connected with railroads in the Western United States as fireman, then engineer, then locomotive foreman, and finally as fuel executive. Since 1908 he has been a coal-mining executive for mines in Kentucky, Ohio and the West, and during the first World War was manager of fuel conservation for the Railroad Administration, later acting as adviser to the U. S. Coal Commission. A leader in mechanization, Mr. McAuliffe's even greater interest in personnel and safety is reflected in numerous trophies awarded his mines.

Industrial Machinery Men Needed by OPA

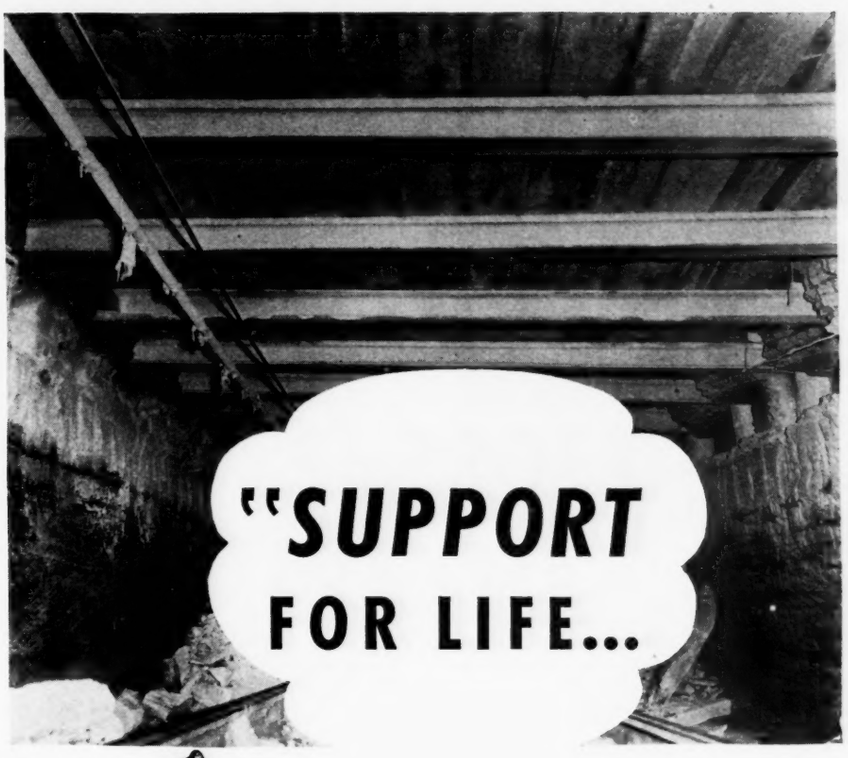
Executive sales engineers with extensive experience in the industrial machinery field are needed for important duties in the Office of Price Administration, Leon Henderson, Administrator, announced Nov. 12.

Positions in the Industrial and Agricultural Machinery Section are open to professional men with technical training and practical engineering background in the manufacture of pumps, compressors, blowers, elevators, conveyors, cranes, measuring instruments, mechanical stokers, boilers, valves, refrigeration and air-conditioning equipment, construction machinery, fabricating machinery, farm machinery, and electrical generating equipment.

Familiarity with the problems and methods of cost analysis, estimates, and production is highly desirable.

Salaries range from $3,800 to $5,600 a year. There will be no written examinations. Applicants will be rated on experience and education. Engineers interested are asked to send in immediately a typewritten résumé of their experience (confined to a page if possible), together with address, height, weight, date of birth, marital status, and education.

A record of past employment, beginning with the most recent position and working



...And Du Pont 'CZC' is the Reason Why!"

THOSE timber roof supports, at the mouth of the Wheeling Township Coal Mine, Adena, Ohio, went up a year ago. They're subjected to every kind of rot and decay — and to general water seepage during wet weather.

The life of the mine will probably be from 15 to 20 years, and the life of the timbers just as long — with no need for replacements. For they're treated with Du Pont "CZC".

"CZC" was chosen for the job because it's been so successful in other mines, both above and under ground. Engineers everywhere know that this treatment extends *full timber strength* over a longer life . . . and that it's clean, paintable, fire-retardant and odorless.

Why not put the "CZC" Factor of Safety to work for *you*?

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Grasselli Chemicals Dept., Wilmington, Delaware.

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CHROMATED ZINC CHLORIDE

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Harold L. Ickes

back, must be included. Material should be addressed to Joel Dean, Office of Price Administration, Room 238, Temporary Building "D," Independence Ave. and Sixth St., S.W., Washington, D. C.

•

Would Enjoin Wage Violation By Coal Company

An injunction was sought Nov. 6 in Federal District Court at Springfield, Ill., by the Wages and Hours Division of the U. S. Department of Labor to restrain the Panther Creek Mines, Inc., from allegedly violating the Fair Labor Standards Act. This is the first major court action brought by the division against a coal company.

The complaint charges that the company, which employs 650 persons, paid less than minimum wages (by making deductions contrary to regulations, Part 531), failed to pay time and a half rate for overtime, and did not keep adequate records of wages paid, hours worked, and other working conditions. Since a substantial portion of the coal mined by the company is shipped in interstate commerce, the action charges that it is subject to the wages-hours act.

•

Hanna Acquires Coal Acreage

Purchase of additional coal acreage by the Hanna Coal Co. in the eastern Ohio field has been disclosed by County Recorder Tom McCort of Belmont County. The property acquired is in Richland, Pultney and Smith townships and was formerly owned by the Southeastern Coal Co.

•

Hillman Leases Kennedy Mines

Hillman Coal & Coke Co., Pittsburgh, Pa., announces that it has leased the following coal mines from the Kennedy interests, of Pittsburgh: Fayette mine of the Lowber Gas Coal Co., near Fayette City, Pa.; Ontario mine of the Ontario Gas Coal Co., near Cokesburg, Pa.; and Poland mines of the Poland Coal Co., near Greensboro, Pa. The first two leases were effective on Nov. 1 and the last named went into effect on Nov. 16.

Ickes Named Coal Coordinator; Gray Made Acting Director

President Roosevelt announced on Nov. 7 the appointment of Secretary of the Interior Ickes as "Solid Fuels Coordinator for National Defense" and placed on him responsibility for assuring an adequate supply of coal and coke for armaments, industrial and civilian purposes. The secretary will continue to handle oil problems.

Mr. Ickes named as acting director of Solids Fuels Coordination, effective Nov. 24, Howard A. Gray, Director of the Bituminous Coal Division. Daniel H. Wheeler, Assistant Director of the Coal Division, was made Acting Director of the latter Division. Mr. Gray, who has been a federal officer for eight years, also has an iron and steel background. He entered the federal service as Director of the Inspection Division of the Federal Emergency Administration of Public Works. Subsequently, he served as Director of the Housing Division of the Public Works Administration and as Assistant Administrator of that Administration until 1939, when he became Director of the Coal Division.

In a letter on Nov. 5 the President notified Mr. Ickes that it is becoming increasingly urgent that the supply of solid fuels be adequate at consuming points, adding that difficult problems already are arising in this connection, making necessary "the efficient and carefully coordinated development, production, distribution, utilization, transportation and handling" of such fuels.

Natural Choice for Job

Pointing out that the Department of the Interior includes the Bituminous Coal Division, the Bureau of Mines and the Geological Survey and that the secretary already was Petroleum Coordinator for National Defense, the President indicated that Mr. Ickes was the natural person to handle the job.

The President's letter continued:

"I am, therefore, requesting that you, as Secretary of the Interior, shall act as Solid Fuels Coordinator for National Defense in performing the following duties:

"1. Obtain currently from the appropriate defense and other federal agencies, from the various States and their subdivisions, and from any other sources, private or governmental, information as to the military and civilian needs for solid fuels;

"2. Obtain currently from the solid fuels industries and from any other sources, governmental or private, information relating to development, production, supply, availability, distribution, utilization, transportation and handling of solid fuels;

"3. Make recommendations to the Supply Priorities and Allocations Board, the Office of Production Management, the Office of Price Administration, the transportation agencies of the Federal Government and to any other appropriate federal departments and agencies concerning measures relating to the production, storage, pooling, transportation, distribution, marketing and consumption of solid fuels for the purpose of promoting the maintenance of a ready and adequate supply at reasonable prices;

"4. In cooperation with the solid fuels and related industries and with consumers of solid fuels, and in coordination with the Office of Production Management, carry on such programs as will promote economy and efficiency in the development, production, distribution, utilization, transportation and handling of solid fuels, and as will facilitate the operation of the solid fuels industries so as to meet the requirements of the national defense program;

Harris & Ewing

Howard A. Gray

"5. Advise and make recommendations to the Supply Priorities and Allocations Board, the Office of Production Management, and other appropriate defense agencies with respect to the material, equipment and supplies which will be required by the solid fuels industries in producing, transporting and distributing the tonnage needed for civilian and defense purposes;

"6. Make other recommendations to appropriate federal departments and agencies concerning measures affecting the supply and availability of solid fuels as may seem necessary from time to time.

"In carrying out these responsibilities, the determination of the Supply Priorities and Allocations Board and of the Office of Production Management will, of course, govern as to the requirements for national defense, direct and indirect, and as to the establishment and administration of priorities and allocations.

"The heads of the agencies and departments concerned are being informed of this designation and I am requesting that they inform you in advance of any action proposed which may affect the maintenance of an adequate supply of solid fuels and of all meetings or conferences dealing with these problems.

"I anticipate that you will use your present staff in the discharge of these responsibilities to the fullest extent possible. Within the limits of such funds as may be made available, you may make provision for the necessary services and facilities and you may employ necessary additional personnel, including the appointment or designation, with my approval, of an assistant to whom you may make any necessary delegation of functions."

•

Hot Spot Resumes Operation

Mines of the Hot Spot Coal Co. at Hot Spot, Ky., resumed operation on Nov. 6 with about 200 men at work. The properties had been idle since 1938.

MARATHON

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Program of Broad Scope Marks Annual Meeting Of Illinois Mining Institute

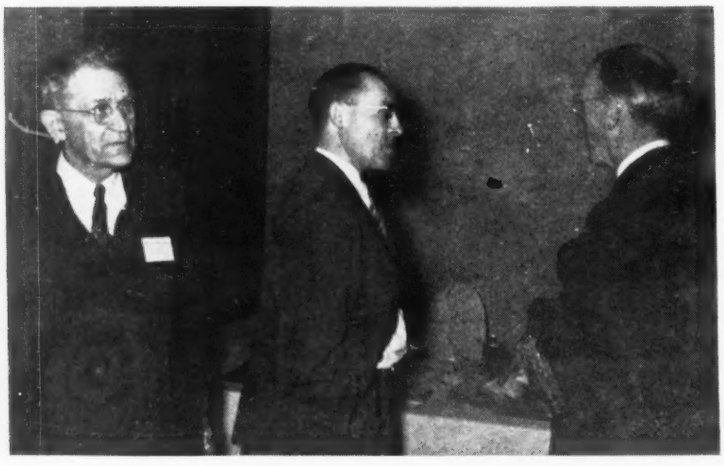
A BROAD program of subjects of vital interest to the coal industry marked the 49th annual meeting of the Illinois Mining Institute, held Oct. 31 at the Hotel Abraham Lincoln, Springfield, Ill. With President M. M. Leighton in the chair, topics considered included the effects of modernization on safety, coal-preparation control, our obligation to the State Conservation Department, and personal relations.

"It is rather difficult to name definitely the effect of mechanization on mine safety," said C. A. Herbert, supervising engineer, U. S. Bureau of Mines, Vincennes, Ind., "without considering the all-important factor of the interest of management in men." With mechanical loading here to stay it is important to recognize the hazards mechanization has brought, and take steps to correct them.

Some Illinois mines, he said, have better safety records than they had with hand mining, due to increased interest in safety. Most dangerous, he warned, is the transition period, especially if the operator fails to consider his mine conditions. Safety and efficiency, he pointed out, go hand in hand—generally. To obtain the best results a preliminary study is necessary. When bosses lean toward tons per man, it is difficult to make progress toward safety; but a company sold on safety gets safety. "Any money or effort spent on safety has paid big dividends," said an Illinois operator, lamenting he had not sooner realized the benefits to be derived from safety efforts.

With mechanical mining the percentage of accidents from roof falls has been maintained; but it could be lowered. There is a tendency to neglect face timbering; here is an opportunity. Added electrical equipment has increased shock hazard as well as fire and explosion hazard; these can be overcome by careful selection and proper maintenance of equipment. The Bureau of Mines for years has advocated the use of properly maintained permissible electrical equipment. Because of its greater ruggedness it is worth the cost.

Bess Corwine, M. K. Harrington and Frank F. Tirre (past secretary and honorary life member) sell the last of the banquet tickets.



Herman Seekamp, Superior Coal Co., looks on as G. M. Glidden, E. D. Bullard Co., and Roy Adams, Old Ben Coal Corporation, discuss the convention.

Calling attention to the grounding of electrical equipment for the safety of operatives, Mr. Herbert said: "Shaft operators have not kept pace with strip operators in this respect." The hazard from gas has been increased by the more rapid removal of coal by mechanical methods; for several reasons, coal-dust hazard also has been increased. The face is not as completely loaded out as in hand mining; coal spilled from cars is ground to dust and rubber-tired cars stir it up; the speed of work delays rock-dusting. So that, all told, hazards are increased by mechanization.

To allay the dust, Mr. Herbert suggested the use of wetting agents and better ventilation. The remedy for more dust is to prevent its formation; a better job can be done than by spraying, he said, and with far less water.

C. S. DeWitt, Chicago, Wilmington & Franklin Coal Co., is greatly interested while his friend looks on.

Although there are fewer accidents with machine loading, Mr. Herbert pointed out that the severity has increased. He urged effort to eliminate roof-fall accidents as well as explosions.

Discussion indicated the belief that because fewer men were exposed the severity was automatically intensified; also that frequency is lower because men are concentrated and better supervised.

Roy Adams said: "If we can do anything to reduce surface tension [of the wetting agent], we help the dust situation."

An Indiana visitor remarked: "We have a new timbering law. Timber must be set to 12 ft. from the face before cutting."

A case was cited where maintenance men, in their haste to get a loading machine back to work, failed to reset a prop—"too much hurry to get out coal."

Howard Lewis declared: "If our men knock out a prop they immediately stop and replace it. Safety, in Franklin County, predominates."

Speaking of coal-preparation control, Paul W. F. J. Moran, preparation manager, Pyramid Coal Corporation, Pickneyville, Ill., said: "Uniformity is the watchword for the coal-preparation engineer." Never was the need for scientific preparation of coal so urgent. The preparation engineer must produce a better and more uniform product and handle higher tonnages through his plant.

Coal preparation has two phases, chemical and physical. Ash is the chief element to be controlled for chemical effect. Crushing (to meet the demand for smaller sizes), sizing and mixing are the physical elements subject to control. As the demand grows for stoker coal—made by crushing—with an accurate and uniform size content, the importance of screen sizing control increases. In few coal-preparation plants do all sizes of a mixture start or stop going into cars at the same moment. Hence the importance of eliminating delays.

For his own control work Mr. Moran uses a shaking screen of inverted Parrish type and a Ro-tap machine for screen testing. The shaker screen makes six size divisions without change of plates. Screen plates are available in $\frac{1}{8}$-in. steps; for small sizes in round perforations they may be had in $\frac{1}{16}$-in. steps. The Ro-tap screen has a full set of 8-in.-diameter brass sieves for the finer sizes. Samples usually are broken down by $\frac{1}{8}$-in. steps and through the full set of Ro-tap screens.

Methods of testing will vary widely with different types of coal and cleaning equipment. Waste of time by older methods brought about the development of the rapid "control ash" method which has been adopted by many laboratories. Mr. Moran cited three methods of washery control: visual, sink-and-float, and ash regulation.

The visual method may be used where low-specific-gravity material accumulates at the separation point. In this case the separating gravity is near the dividing line between clean coal and refuse, hence this method is of little value where the separating problem is difficult.

As all coal-cleaning devices depend on the difference in specific gravity between coal and impurities, some sink-and-float tests must be made. It is tedious but essential.

Herbert E. Rhein, American Brattice Cloth Co., and J. G. Crawford, general manager, Valier Coal Co., pose.

By using graphs worked out for each individual coal, sink percentages may be converted into ash content, but with wide variation in results. However, the customer is interested in the ash content rather than the percentage of sink material.

Increasing size and tonnage handled in preparation plants requires rapid control methods. Prevailing practice enables cleaning-plant operators to obtain control ash

At Consolidation Coal's New No. 32 Preparation Plant, it's a— "BROWNIE" LAYER LOADING HOIST!

The Consolidation Coal Co., in building its new No. 32 Preparation Plant, selected the latest, most up-to-date equipment, *which included a "BROWNIE" Layer Loading Hoist for handling cars beneath the loading chutes.* This choice of a BROWN-FAYRO product by another prominent operator gives further evidence of BROWN-FAYRO's well-rounded quality, long service life and ability to do the job. Like countless other operators, make BROWN-FAYRO your selection . . . for hoists, tubing blowers, mine cars and wheels, gathering pumps, and other cost-reducing mine products. Write for complete information.

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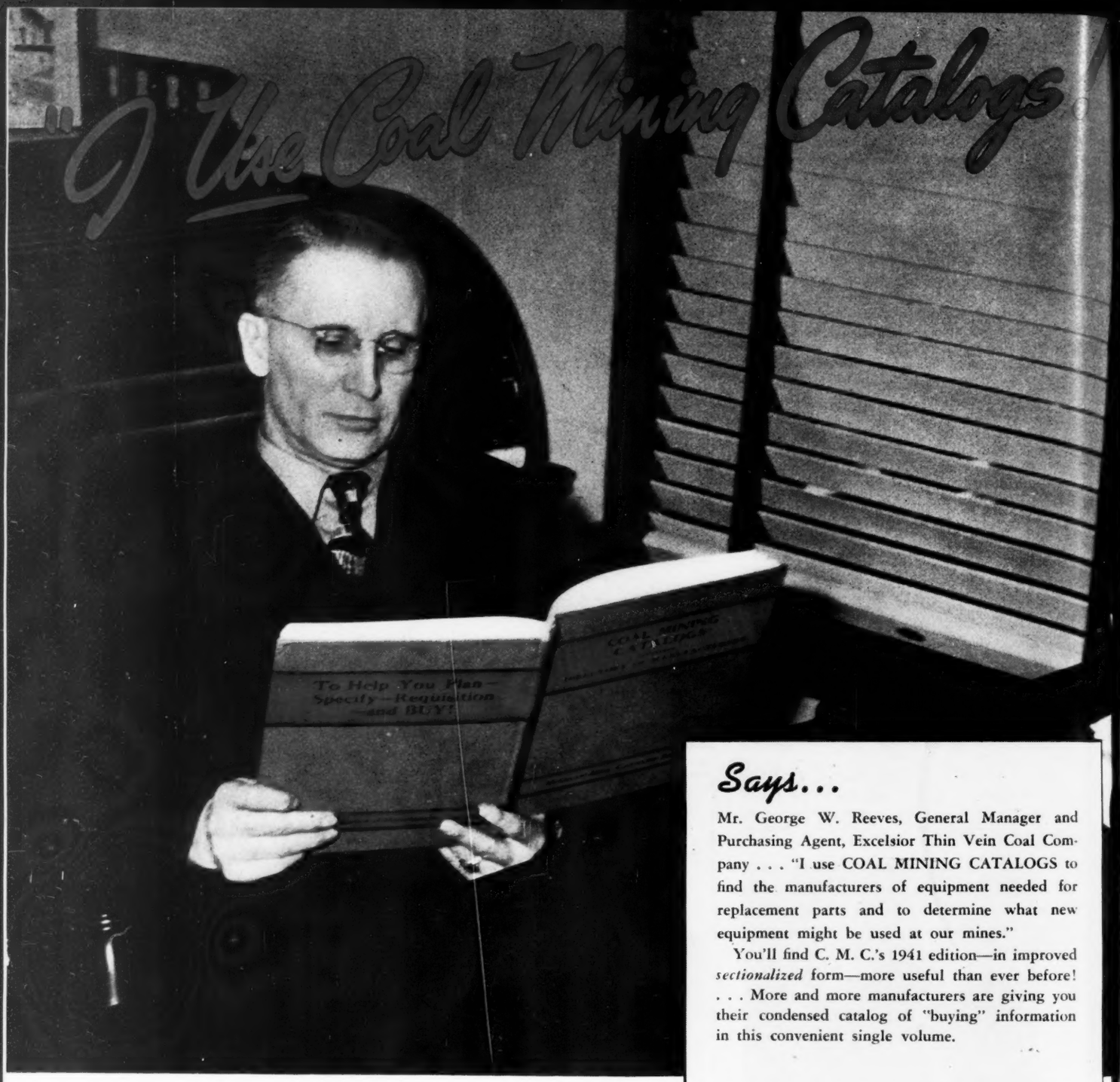

Says...

Mr. George W. Reeves, General Manager and Purchasing Agent, Excelsior Thin Vein Coal Company . . . "I use COAL MINING CATALOGS to find the manufacturers of equipment needed for replacement parts and to determine what new equipment might be used at our mines."

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Dec. 41

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results in about 20 minutes after collecting samples. Speed being essential, a routine to utilize all possible mechanical aids must be worked out. A laboratory location on the down-track side is suitable for most plants. The more mechanized the routine, the fewer men needed.

Collection of samples is as diverse as the number of mines, varying from daily composite samples to sampling every car of cleaned coal. Several mines have adopted half-hourly sampling. Varied routines are followed after collection of samples, from modified rapid ash determination to complete proximate analysis according to A.S.T.M. methods.

Sampling Every Car Favored

To achieve the utmost in uniformity of ash, numerous small samples are necessary. Mr. Moran favors sampling every carload and making a quick analysis with sufficient accuracy (not necessarily absolute) for control.

Brought directly to the laboratory, the sample is crushed to about 10-mesh through a 12x12-in. ring crusher. The retained portion is spread thinly in a shallow pan, which is placed in a drying oven at about 400 deg. F. In about 4 minutes, moisture is reduced to 2 or 3 per cent—more or less uniform, so that control ash, which is run later, may be immediately converted to an approximate dry basis. The dried sample is pulverized to 60-mesh in a disk pulverizer, riffled to about 2 oz., placed in a stoppered bottle, and passed to the analytical room.

A 1-gram sample is placed in a combustion boat, which is put into a single-unit Hoskins Type FD303 electric combustion tube-furnace fitted with a reduced-end combustion tube and a rheostat to regulate temperature. Arrangement is provided for preheating the boat at a lower temperature to drive off the volatile matter without violence. In the high-temperature section, rapid combustion is accomplished by adding oxygen in the combustion tube.

Oxidation is completed in 5 minutes. Upon complete ashing of the sample it is withdrawn and cooled for weighing. The resulting figure is designated as "control ash" and is flashed to the operator in charge of the plant. By making a 2½ per cent moisture allowance the moisture-free ash may be calculated immediately. Experience indicates that this is a reliable figure. The exact figure is available within an hour.

On the subject of our obligation to the State Conservation Department, Livingston E. Osborne, director, Illinois Department of Conservation, defined the preservation of Nature's gifts thus: "Conservation is the wide use of non-renewable resources — coal, forests, fish and game. Thrift is the most important principle in their use."

One answer to the complaint that streams are being polluted by gob piles, said Mr. Osborne, is a suggestion that gob be put underground. In contrast to the losses of coal in deep-mine operation—recovery in some cases being as low as 50 per cent—the speaker pointed out that stripping gets out all the coal. Nevertheless, there have been complaints that it destroys tillage value. In cooperation with the Conservation Department, however, the mining companies have provided pasturage and timber.

Up to the present, said Mr. Osborne, five million trees have been planted on stripped Illinois lands; one-third are black locust, which have become prop size in 10 years; one-third pines, and the remainder miscellaneous trees. Pasturage for livestock has been provided on 1,100 acres. Returns on the average are said to equal those of agricultural crops.

Many lakes, the natural result of stripping operations, have been stocked with fish; any lake open to the public will be so stocked free. Large quantities of quail and pheasants also have been released, so that hunting has been provided by reclamation of such areas. At Danville, such lands have been converted into a State park. Discussion brought out that rescue crews are provided by the State to save fish from drying streams and ponds and to transfer them to more favorable locations.

"The term personal relations," said Harry Moses, president, H. C. Frick Coke Co., Pittsburgh, Pa., "has acquired in recent years an industrial definition which means, broadly, the character of relationship that exists between employer and employee. You all know well that the day of blind devotion to or trembling fear of the boss and his power has vanished from the bituminous coal industry. And with that departure came an attitude of resentment by the employee toward constituted authority and discipline; an attitude of 'to hell with you; I know my rights,' to the point that the employee is not maintaining his own best interest and, certainly, not the best mutual interest. The breaking down of this resentment, the cultivation of a community of interest, is the problem of industrial personal relations."

The home is the simplest form of recognized government in democracies. The urge to establish and maintain a home, to have and protect a family, is instinctive in all of us. The man who recognizes this social responsibility is entitled, regardless of his faults, to full respect. If this thought has

New Officers

Officers of the Illinois Mining Institute elected for 1942 are:

President—J. A. Jefferis, Illinois Terminal R.R.

Vice President—Carl Hayden, vice president and general manager, Sahara Coal Co.

Secretary-Treasurer—B. E. Schonthal, president, B. E. Schonthal & Co.

Executive Board—R. M. Medill, director, Department of Mines and Minerals; B. R. Gebhart, vice president, Chicago, Wilmington & Franklin Coal Co.; Carl Lee, chief engineer, Peabody Coal Co.; Lee Haskins, superintendent, Zeigler No. 1 mine, Bell & Zoller Coal & Mining Co.; J. G. Crawford, general manager, Valier Coal Co.; G. S. Jenkins, general superintendent, Consolidated Coal Co.; Howard Lewis, general underground superintendent, Old Ben Coal Corporation; Fred A. Miller, assistant to vice president in charge of operations, Franklin County Coal Corporation; Byron Somers, general superintendent, Truax-Traer Coal Co.; D. D. Wilcox, general superintendent, Superior Coal Co.; C. W. Woosley, general superintendent, Pyramid Coal Corporation; M. M. Moser, vice president, United Electric Coal Cos.

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OSMOSE TREATED TIES AND TIMBERS

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been indelibly impressed on our industrial organizations, then, and only then, are we started on a proper approach to personal relations.

There are many approaches which reach all our employees, such as better and safer working conditions than our competitors maintain, and developing an *esprit de corps* in our plants. In the final analysis we must cultivate each personality; must learn about his problems at home, and extend sympathy, congratulation and advice. Adjust unfortunate conditions of work and develop an interest in his leisure time. A long, hard pull, but persistence brings results.

Above all, we should meet unreasonable demands firmly, with frank discussion of their merits. If unable to convince a recalcitrant employee, a firm position will gain his respect. Personal relationship is simply an honest attempt by an employer to cultivate the friendship and trust of each employee, as one might that of any worthwhile individual.

George F. Campbell, vice president, Old Ben Coal Corporation, rose to pay tribute to a former employee of that company who was his ideal in dealing with men in the mine: Jack White.

John D. Battle, executive secretary, National Coal Association, who spoke at the dinner, said in part: Coal is the greatest natural resource known to man. The supply in our country is good for three thousand years. Bituminous producers are ready, willing and able to boost the annual output to 550,000,000 tons for the coming defense year. At the same time he advised that the mistakes of World War No. 1 be avoided; that we improve existing operations, and go slow on new mines.

Reviewing the job ahead of the coal industry, he paid tribute to the nation's railroads for their splendid job in handling coal, and expressed hope that the labor situation would clear. "When the final day comes, all this turmoil will be settled in the American way. Let us do our job to the last man."

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Suspension Pay Denied Miners By High Court

In a decision which is expected to have the effect of covering two West Virginia mine suspensions, the State Supreme Court of West Virginia ruled on Nov. 4 that the stoppage of work during the 1939 Appalachian wage negotiations was a labor dispute and barred payment of out-of-work benefits.

Although the court in its 4-to-1 decision ruled only on claims arising from the shutdown of seven weeks in 1939, the Unemployment Compensation Department will be guided by the ruling in regard to the four-week suspension last April. The department had withheld benefits for the 1941 shutdown until the court ruled on the 1939 case.

Judge Fox, who wrote the opinion, said:

"The mine workers were voluntarily idle because they followed their organization in an attempt to better their condition. They sought additional advantages, as they had the right to do, but in exercising that right they became involved in a labor dispute, which, under our statute, prevents them from receiving unemployment benefits by reason of the continuance of such dispute."

West Virginia Institute, Meeting at Morgantown, Hears of Inspection and Priorities

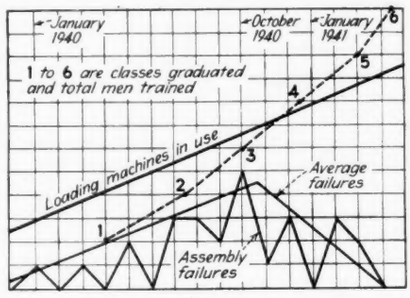
DISCUSSION of new federal agencies affecting coal-mine operation drew a large assemblage at Morgantown Nov. 7 to the 34th annual meeting of the West Virginia Mining Institute. J. J. Forbes, chief engineer, Coal Mine Inspection Division, U. S. Bureau of Mines, explained developments and interpretation of the federal inspection act, and Dr. Wilbur A. Nelson, administrator, Mine Priorities, Office of Production Management, outlined procedure for obtaining materials and answered questions regarding emergency repairs.

Personnel training was discussed in papers by J. J. Foster, assistant to the vice president, Island Creek Coal Co.; D. A. Maurer, assistant division maintenance superintendent, Consolidation Coal Co.; G. R. Spindler, assistant director of mining extension, West Virginia University, and F. F. Jorgensen, labor commissioner for the Northern West Virginia Coal Association. Rehabilitation of injured workmen was advocated in a paper by S. R. Pursglove, attorney, Pursglove Coal Mining Co. Rounding out the program, A. B. Crichton Jr., superintendent, Logan No. 4 mine, Johnstown Coal & Coke Co., described the dewatering and installation of mechanical mining at that property, and W. E. E. Koepler, secretary, Pocahontas Coal Operators' Association, dealing with the possibilities of reconstruction by research, urged that the Federal Government initiate the research provided for in the Bituminous Coal Act.

That a systematic employee training program is applicable to mining operations and that the larger company should hire as an instructor a graduate engineer, preferably with some teaching experience, but above all with practical mining experience, was advocated in the paper prepared by Mr. Forster and read by L. H. Winger, of the Island Creek personnel department. The paper suggested that without undue burden a mining operation can set up training programs for groups as follows: (1) supervisory production, (2) maintenance foremen, (3) apprentice group.

Commenting in discussion on whether it would be best to select instructors from among local men so that students would feel more free to ask questions, R. E. Salvati, vice president and general manager, Island Creek Coal Co., declared emphatically that the instructor should be college trained, "but, of course, should have a suitable personality." His company recently embarked on a personnel training program. In the last few years the company has employed about 15 young graduate engineers.

The accompanying graph, showing how failures on a loading-machine assembly or unit part, for one coal company, began to drop rapidly after October, 1940, the date of graduation of the third class in maintenance,



Machine failures drop after classes.

was an exhibit of the paper by D. A. Maurer, who instructs these classes. They are conducted by West Virginia University at the central shops of the Consolidation Coal Co. in cooperation with the Joy Manufacturing Co., which furnished the equipment. In the six classes that have been completed 112 men were enrolled, and of that number 86 passed and received certificates from the university.

Charles F. Robbins, electrical inspector, Industrial Collieries Corporation, a recent graduate of this maintenance personnel class and prior to that graduated from a college electrical engineering course, stated that much good comes from an understanding promoted by an attendance of both supervisory and maintenance men.

In the summary of his paper, "What the University and Other Public Agencies Can Contribute to a Mine Personnel Training Program," Prof. Spindler said that since 1913 the West Virginia vocational mine classes have enrolled over 37,000 men and "many of those are now holding minor and major executive positions in the coal industry of West Virginia." He put emphasis on the evolution wherein mining must now be considered in terms of highly mechanized units and included in the supervisory group those responsible for care and maintenance of machinery.

The interests of each of the six following groups were explored by Mr. Jorgensen in his paper, "What the Coal Industry Needs and Expects From Personnel Training Programs": (1) stock and bond holders of coal companies, (2) executives and officials of coal companies, (3) sales departments of coal companies, (4) employees of coal companies (other than executives and officials), (5) owners of coal rights

Institute Officers

T. E. Johnson, vice president, Hutchinson Coal Co., was elected president of the West Virginia Coal Mining Institute, Nov. 7, at its annual business session at Morgantown, W. Va. Mr. Johnson succeeds W. G. Crichton, vice president, Johnstown Coal & Coke Co. Other officers were chosen as follows:

Vice presidents — John T. Sydnor, vice president, West Virginia Coal & Coke Corporation; M. H. Forrester, assistant general manager of operations, Consolidation Coal Co.; L. C. Tierney, president, Tierney Mining Co.; Joseph Pursglove Jr., general manager, Pursglove Coal Mining Co.

Secretary-Treasurer—D. L. McElroy, director, School of Mines, West Virginia University, but now on leave in Washington as technical adviser on coal priorities.

operated by coal companies, (6) consumers of coal.

Regarding the interest of the sales department in personnel training he observed that in addition to "production of a salable product below selling price" that department expects the training to produce an operating organization which will respond quickly to the various demands of the markets. He urged that a representative committee of coal executives and officials meet with the president of the university and his staff to determine a general outline of training and how much of it should be given at the university.

Conveyors Considered

Haulage, said Mr. Crichton when describing in detail mechanical operation of Logan No. 4 mine in Cambria County, Pennsylvania, has been the worst aggravation, and now belt conveyors are contemplated for the butt headings. This mine, put back into production in July, 1940, following 4½ months of dewatering (600,000,000 gal. pumped), is in the "B," or Lower Kittanning, seam, where coal thickness averages 40 in. including not over 6 in. of top coal. Cutting is done with Jeffrey 29C crawler-mounted arcwalls with 9-ft. bar; drilling with Joy drills with 9-ft. boring bar; loading with Joy 14BU machines, and gathering with shuttle cars of two types: Joy battery-operated and Lee-Norse cable-reel.

"Our most important mechanical problem," said Mr. Crichton "depends on the fellow classified as unit mechanic," and, he continued, "were it possible, I would recommend at least six months' training period for any man selected to handle mechanical and electrical repair work." Necessary inventory of replacement or spare parts he estimates at 10 per cent of the capital invested in the machinery.

In a paper which he termed a selling job for broadening the possibilities afforded for reconstruction research by the new Mineral Industries Building at the university, Mr. Koepler listed the current coal-research projects under way at the school and referred to a *Coal Age* listing of research projects completed, in progress or planned for 1941 (February, 1941, issue, p. 89).

Reemployment by the coal operator, according to S. R. Pursglove, attorney, is the only solution of the problem of the injured worker; for instance, one losing a leg, and who by the present compensation laws is otherwise destined, if he is a typical case, to become a "first class bum," a bad influence in the mining community and a poor advertisement to the industry. Although in his paper he advocated the establishment of a non-political and voluntary organization to study the problem of the crippled workman in West Virginia, he urged the operators to undertake at once rehabilitation work with the view to reemploying the men, adding: "you will be surprised with the results you obtain."

J. J. Forbes placed Feb. 15, 1942, as the probable date when a force of federal inspectors will be in the field under the new Coal Mine Act. It is expected that during the first year 107 inspectors, 5 mining electrical engineers and 5 mining explosives engineers will be appointed and these will at first give attention only to the 2,500 coal mines employing more than 25 persons.

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Ironite **Mine Telephone Wire**

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- Heavily insulated—30% para rubber
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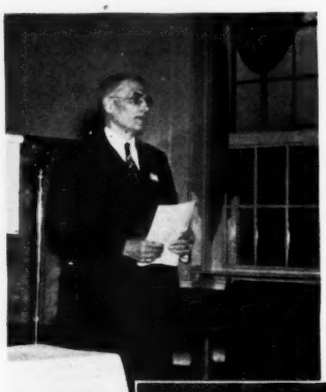
Yet, with all these superior features, IRONITE is priced to save you from 20% to 30% over copper or bronze.

Write your specifications for quantity quotations.

Paragon Electric Co. 405 S. Dearborn, CHICAGO

New officers, Messrs. Forrester, Pursglove, McElroy and Johnson, with retiring President Crichton.

F. F. Jorgensen analyzes advantages of personnel training.



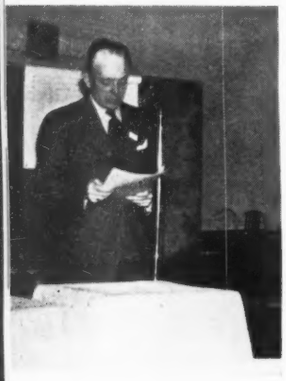
G. R. Spindler — mining is supervising machine units.

L. H. Winger reads J. J. Foster's paper.

S. R. Pursglove advocates reemployment of injured men.

J. J. Forbes, chief engineer, Coal Mine Inspection Division.

D. A. Maurer—maintenance instruction.



A. B. Crichton, Jr. —mechanical loading

Wilbur A. Nelson, Administrator, mine priorities.

R. E. Salvati—has adopted personnel training.

T. E. Johnson presiding and W. E. E. Koepler speaking.

W. G. Crichton, retiring president.

New president, T. E. Johnson.

Later, to cover all coal mines of the United States, 6,000 to 7,000, it is likely that the force will be increased to 250 or more. In Mr. Forbes' paper he outlined the act and reported on progress to date. By Oct. 1, 1,450 applications for positions had been graded by the Civil Service Commission and 895 classed as eligible.

Dr. Nelson confined his prepared paper to explaining procedure under Preference Rating Order P-56 of Sept. 17, which speeded the delivery of maintenance parts. In answer to a query relative to obtaining material for an anticipated breakdown he said there is hope of getting through an order for mines comparable to one applying to steel mills. Relative to the small mines employing less than ten men, they must for the present continue under Preference Rating Order No. P-22. Emergency State coordinators have been instructed to confine the awarding of P-56 serial numbers to mines larger than that.

Prof. D. L. McElroy, technical adviser on coal priorities, outlined the following three ways in which a mining company can help the situation: (1) be resourceful in making use of available materials on the job, (2) eliminate every bit of waste and do not overlook reclamation of the smallest items, (3) train men to cut maintenance cost and that will result in a saving of materials.

•

Duvin Mining Property Sold

Mining property of the Duvin Coal Co. at Providence, Ky., has been sold at auction to the Kentucky Bank & Trust Co., Madisonville, Ky., for $70,000. The sale was ordered to satisfy liens against the property following an explosion in 1938 in which 28 men were killed.

•

Duncan Acquires Coal Tracts

Leo Duncan Mining Co., Uniontown, Pa., of which Leo Duncan is president, has purchased 457 acres of coal lands in Redstone and Brownsville townships from Penncoal, Inc. There are two deep mines and one stripping operation on the property, and the new owner expects to be ready to produce at an early date.

•

Industrial Notes

CARDOX CORPORATION has placed Harry Ensminger, of the Chicago office, in charge of its newly established New York office, at 233 Broadway, serving New England, eastern New York and New Jersey.

ENTERPRISE WHEEL & CAR CORPORATION, Bristol, Tenn.-Va., announces that Robert W. Lahr is now associated with it as sales engineer in the Pocahontas territory of West Virginia. Mr. Lahr, who formerly was sales manager of the Phillips Mine & Mill Supply Co. at Pittsburgh, Pa., succeeds Frank P. Smith, who left to organize the Lando Coal Corporation at Delbarton, W. Va., of which he is now president and treasurer.

KEYSTONE CARBON CO., St. Marys, Pa., manufacturer of commutator and slip-ring brushes, porous bronze bearings, negative temperature coefficient resistors, and electri-

CONCENCO PRODUCTS

SuperDuty DIAGONAL DECK No. 7 COAL WASHING TABLE

DEISTER DIAGONAL DECK OVERSTROM

Synonymous with Safety

For over thirty-five years safety has been synonymous with Concenco Products—Safety designed and built into each machine religiously from a background of experience, engineering and alertness to the industry's needs.

That kind of safety reflects in human and economic savings far beyond measurement by purchase price.

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Means Safety in Coal Washing

In the hands of unskilled washery operatives SuperDuty Diagonal-Deck Coal Washing Tables are fundamentally safe. They guard the safety of persons and profits equally.

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YOU'LL FIND PERFECT BALANCE IN . . .

Simplicity GYRATING COAL Screens . . . SMOOTH, "BUILT-IN" POSITIVE ACTION DECREASES WEAR, INCREASES EFFICIENCY!

Being the first to utilize counterbalanced eccentric shafts on mechanical vibrating screens, SIMPLICITY Gyrating Coal Screens today reflect this pioneering experience in a perfectly balanced unit that has the weight of the entire screen deck exactly distributed over the entire assembly. This attention to balance gives SIMPLICITY users positive "built in" action, greater active screen service life and maintenance free operation. When considered in terms of each screen's production, these benefits indicate why SIMPLICITY users achieve such outstanding results as five, *eight* or even *ten* seasons of service without overhauling . . . *records that you can duplicate.* Investigate SIMPLICITY Screens . . . call in a SIMPLICITY engineer, and let him recommend the proper screen for your operations. Screens in single, double and triple deck types, 2'x3' to 5-x24'.

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Sales Representatives Located in all parts of U. S.

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cal contacts, has opened an Eastern sales office at 249 High St., Newark, N. J. Robert McKeown and Charles V. Allen are district representatives, succeeding the late E. A. Berger, sales engineer.

United States Steel Corporation has appointed J. V. Freeman as assistant to vice president in charge of coke byproduct sales of all the company's subsidiaries, with office at 71 Broadway, New York City.

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Coal-Mine Accident Fatality Rate Tends Downward

Accidents at coal mines of the United States caused the deaths of 92 bituminous and 16 anthracite miners in September last, according to reports furnished the U. S. Bureau of Mines by State mine inspectors.

With a production of 45,464,000 net tons, the accident death rate among bituminous miners was 2.02 per million tons mined, compared with 2.35 in September, 1940.

The anthracite fatality rate from accidents in September last was 3.11, based on an output of 5,138,000 net tons, against 4.31 in the corresponding month of last year.

For the two industries combined, the accident fatality rate in September last was 2.13, compared with 2.55 in the ninth month of the preceding year.

Fatalities during September last, by causes and states, as well as comparable rates for the first nine months of 1940 and 1941, are shown below:

Illinois Mining Electric Group Studies Mine Gases

Demonstrating the effect of carbon monoxide on mice, followed by resuscitation, to illustrate what is being done to combat gas fatalities in coal mines, C. M. Donohue, assistant manager of the mining department, Mine Safety Appliances Co., Pittsburgh, Pa., was the guest speaker at the Nov. 7 meeting of the Southern Illinois Mining Electric Group, at West Frankfort, Ill. He also exhibited a Canadian Government talking movie featuring the Canadian gold-mining industry and safety measures for its men.

"One of the worst gases encountered in mines," said Mr. Donohue, "is carbon monoxide. An odorless, tasteless, colorless gas, it is produced from any number of sources. It is the cause of 50 per cent of the deaths from explosion disasters and mine fires." Extremely small quantities are fatal, as little as 0.2 per cent sometimes causing unconsciousness in 30 minutes.

Human beings can stand but 8 hours exposed to an atmosphere with but 0.01 per cent carbon monoxide content. The effect is to reduce the red corpuscles in the blood, which gradually but continuously absorb carbon monoxide and give up oxygen. Mr. Donohue declared: "Absorption of carbon monoxide by the blood to the extent of 55 or 60 per cent of saturation causes death."

Resuscitation is accomplished by 6 or 8 hours' exposure to air, or to 3 or 4 hours' exposure to a mixture of 7 per cent carbon dioxide and 93 per cent oxygen.

Prevention being better than cure, Mr.

UNITED STATES COAL-MINE FATALITIES IN SEPTEMBER, 1941, BY CAUSES AND STATES

State	Underground: Falls of Roof	Falls of Face	Haulage	Gas or Dust Explosions	Explosives	Electricity	Machinery	Other Causes	Total underground	Shaft	Surface	Grand Total
Alabama	2	..	2	..	..	4	..	..	8	..	..	8
Arkansas	1	..	..	..	..	..	..	..	1	..	..	1
Illinois	1	1	2	..	..	..	..	..	4	..	..	4
Indiana	1	..	..	..	..	..	..	1	2	..	..	2
Iowa	..	..	..	..	..	..	..	..	..	1	..	1
Kentucky	8	..	2	..	..	2	..	..	12	..	2	14
Maryland	1	..	..	..	..	..	..	..	1	..	..	1
Montana	..	1	..	..	..	..	..	..	1	..	..	1
Ohio	3	..	..	..	1	..	..	..	4	..	..	4
Oklahoma	1	..	..	..	..	..	..	..	1	..	..	1
Penna. (bituminous)	7	..	3	..	2	..	..	..	12	..	1	13
Tennessee	1	..	..	..	..	..	..	..	1	..	..	1
Utah	3	..	..	..	..	..	..	..	3	..	..	3
Virginia	1	..	..	..	..	1	..	..	2	..	..	2
Washington	..	..	..	..	..	..	..	..	..	..	1	1
West Virginia	19	1	8	..	1	1	1	..	31	..	3	34
Wyoming	..	..	1	..	..	..	..	..	1	..	..	1
Total bituminous	49	3	18	..	4	8	1	1	84	1	7	92
Pennsylvania (anthracite)	11	..	1	1	1	..	..	1	15	..	1	16
Grand Total	60	3	19	1	5	8	1	2	99	1	8	108

DEATHS AND FATALITY RATES AT UNITED STATES COAL MINES, BY CAUSES*

January–September, 1940 and 1941

Cause	Bituminous: Number Killed		Bituminous: Killed per Million Tons		Anthracite: Number Killed		Anthracite: Killed per Million Tons		Total: Number Killed		Total: Killed per Million Tons	
	1940	1941	1940	1941	1940	1941	1940	1941	1940	1941	1940	1941
Underground:												
Falls of roof and coal	415	394	1.246	1.095	77	83	2.010	2.024	492	477	1.325	1.190
Haulage	150	131	.450	.364	32	21	.835	.512	182	152	.490	.379
Gas or dust explosions:												
Local	12	14	.036	.039	3	6	.078	.146	15	20	.040	0.50
Major	236	42	.709	.117	...	...	...	...	236	42	.635	.105
Explosives	19	18	.057	.050	8	12	.209	.293	27	30	.073	.075
Electricity	26	26	.078	.072	5	4	.131	.097	31	30	.083	.075
Machinery	19	22	.057	.061	2	...	.052	...	21	22	.057	.055
Shaft	6	3	.018	.008	3	2	.078	.049	9	5	.024	.012
Miscellaneous	21	10	.063	.028	3	10	.078	.244	24	20	.065	.050
Stripping or opencut	9	14	.027	.039	2	2	.052	.049	11	16	.029	.040
Surface	33	34	.099	.095	6	11	.157	.268	39	45	.105	.112
Grand Total	946	708	2.840	1.968	141	151	3.680	3.682	1,087	859	2.926	2.143

*All figures subject to revision.

Donohue exhibited various pieces of apparatus now commonly used in mines for individual protection and for detection of injurious gases in mine air. The self-rescuer is a small device containing hopcalite, a chemical that converts carbon monoxide to carbon dioxide, a non-poisonous gas. Inhaling through this device will protect the individual against any concentration of carbon monoxide for an hour or more. The Bureau of Mines puts its O.K. on this device for only 30 minutes. It can be carried in a dinner bucket.

Also shown was an all-service gas mask. This protects against all mine gases, the only limit being that the mine air contain at least 16 per cent oxygen. The normal oxygen content in air is approximately 20 per cent by volume.

The self-contained breathing apparatus is much more elaborate. It is good for 2 hours' hard work or for 12 to 16 hours of a rest period. Carbon dioxide from the breath is removed by chemicals, and the unconsumed oxygen and the nitrogen content of the air are recirculated—breathed over and over. The loss of oxygen is made up from a high-pressure oxygen tank, which is a part of the apparatus.

All vehicular tunnels are equipped with carbon-monoxide detectors, which register as little as 0.0001 per cent of that gas in the atmosphere. It was discovered that half the deaths that occurred in the flurry over air-mail contracts a few years ago were carbon-monoxide poisoning. Due to these deaths, the exhaust mechanism of airplanes has been changed to protect pilots. "The development of safety equipment for mines has contributed a lot to our defense," declared Mr. Donohue.

There are several types of methane detectors which register as little as 0.002 per cent, and in increments of 0.001 per cent above that. Methane detectors equipped with a Wheatstone bridge have a platinum filament as the detecting element, and a battery for power. These are arranged to read in per cent of methane, the scale being marked to indicate from 0 to 3 per cent. A blinking light calls attention to the existence of danger. This device may be set at a predetermined per cent of methane, to op-

Bureau of Mines Approvals

Five approvals of permissible equipment were issued by the U. S. Bureau of Mines in October, as follows:

Mine Safety Appliances Co.—M.S.A. Model E-2 methane detector; Approval 809; Oct. 9.

Harris Pump & Supply Co.—Type T-623 Dayton-Dowd pump; 5- or 10-hp. motor, 230 volts, d.c.; Approval 437; Oct. 14.

Goodman Mfg. Co.—Type 97-E-30 chain conveyor; 5-hp. motor, 230 volts, d.c.; Approval 438; Oct. 15.

Portable Lamp & Equipment Co.—Portable single-shot blasting unit (portable mine lamp with blasting attachment); Approval 1222; Oct. 23.

Joy Mfg. Co.—Type 42-D-8P shuttle car (storage-battery operated); three 5-hp. motors, 90 volts, d.c.; Approval 439; Oct. 30.

DALY'S *improved* CHECKING SYSTEM *is better . . .* 5 WAYS

1 Accurately checks and controls either hand or machine loading.

2 Only check that carries the miner's turn on cars.

3 Only check that will eliminate the turn sheet.

4 Locates lost cars with ease. Locates cars on road from day to day.

5 Will not slip or come off while car is being dumped.

This is the only check made up of special ink and paper tested for mine use. Gives weighman a receipt for every car dumped, daily. Backed by 29 years record of satisfaction in many leading coal mines more valuable than ever, under today's operating conditions.

● Get FREE TRIAL OFFER

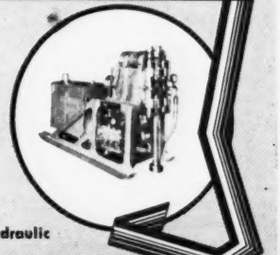
DALY TICKET CO.

Established 1911 Collinsville, Illinois

DIAMOND CORE DRILLING

CONTRACTORS

Specializing in Testing Coal Properties. We Guarantee Satisfactory and "PROPER COAL CORES"



Inside Mine Drilling
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Pre-Grouting for Mine Shafts. Solidification of Wet Mine Areas
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Light Gasoline Drills Save Fuel and Moving Cost
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MOTT CORE DRILLING CO. . . . Huntington, W. Va.

Laughlin drop forged Safety Clips treat wire rope right. No bending — crimping — or fraying the strands. After removing Laughlin Safety Clips, the rope is straight, unbowed, ready for use again — saving wire rope.

Use Laughlin Safety Clips and avoid rope-crimping with U-Bolt Clips.

FEWER CLIPS NEEDED. Laughlin Safety Clips are so efficient that three of them give you the same strength as four ordinary U-Bolt Clips.

Use Laughlin Safety Clips and save money.

THIS TEST DESCRIBED IN NEW BOOKLET. Tests made by a famous engineering school prove conclusively that Laughlin Safety Clips delivered better than 95% of rope efficiency.

Write for the free booklet that describes these tests — and also the other money and time-saving advantages you get with the modern "fist-grip" clip. Use the coupon below.

THE THOMAS LAUGHLIN CO.
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erate additional signals or to shut off power, by the use of a relay. The device is magnetically locked to prevent tampering.

In addition to these and other safety devices, Mr. Donohue exhibited two novel devices (tools) that use smokeless powder for propelling power. By confining the explosions behind accurately made plungers, a few grains of powder is made to punch a hole in the web of a rail or to make a solderless wire or cable splice. The rail punch resembles a screw punch, a plunger taking the place of the customary screw. With the cable splicer, the two cable ends butt together with a round copper sleeve over the joint. The explosion forces out the plunger, compressing the sleeve down to practically wire size, as if done in a hydraulic press.

•

Bituminous Coal Division Moves To Abolish Abuses

Replying to an inquiry, Director Howard A. Gray of the Bituminous Coal Division in mid-November released a statement that coal left over at lake ports at the close of the navigation season may not be sold at a price less than the applicable minimum f.o.b. mine price plus transportation and handling charges unless and until specific permission is obtained from the Division authorizing such a sale.

"In all cases where coal is left over at lake ports," says the statement, "every effort should be made to sell the left-over coal at a price not less than the effective minimum f.o.b. mine price applicable thereto for delivery to the destination to which such shipment is actually delivered and for the use to which it is actually applied, plus all intervening transportation and handling charges incurred in the delivery thereof.

"If, after such solicitation, the coal cannot be sold at or above a price determined in the foregoing manner, then an offer at the best obtainable price should be secured. An affidavit should then be filed with the Director requesting permission to sell the left-over coal at the 'best obtainable price,' specifying the applicable minimum f.o.b. mine and delivered price, the best obtainable price" and other additional information.

Daniel H. Wheeler
Acting Director, Bituminous Coal Division

Declaring that investigations indicate that soft-coal producers have been consistently abusing railroad fuel substitution regulations, Director Gray issued a warning to the coal industry that he would insist that violations be prosecuted to the fullest extent permitted by the Coal Act. He said that in addition to prosecutions he is considering establishing a procedure for denying producers who consistently abuse regulations the privilege of making substitutions without obtaining prior approval from the Division.

Daniel H. Wheeler, Assistant Director, became Acting Director of the Division as of Nov. 24, when Mr. Gray assumed the duties of Acting Director of Solid Fuels Coordination. Mr. Wheeler, who has had 22 years in the federal service, received his early education in Massachusetts, later receiving an LL.B. degree from George Washington University. In the early years of his federal service he was employed in various clerical and supervisory capacities. In 1933 he joined the staff of the Federal Emergency Administration of Public Works, serving as Administrative Attorney and later as Associate and Director of the Projects and Statistics Division of that Administration. With the establishment of the Bituminous Coal Division on July 1, 1939, he became its Assistant Director.

Boost in Ex-River Rates

The Division has ordered an increase of 7½c. per ton in the minimum prices for ex-river coal shipments from mines in western Pennsylvania and northern West Virginia (Districts 2, 3 and 6) via river terminals at Colona and Conway, Pa., to eastern Ohio markets, including the cities of Akron, Canton, Ceico, Cleveland, Lorain, Massillon and Warren. Evidence in a public hearing showed that the minimum price increase was required under the Coal Act in order to permit producers who ship all-rail to compete with ex-river shippers, despite a 7½c. per ton reduction in transportation charges for the ex-river shipments. The Division's order stated that evidence does not indicate that consumers will be injured by the minimum price increase.

Rules and regulations under which producers and distributors may admit violations of the Coal Act and regulations and apply for disposition of compliance cases without public hearings have been approved by Secretary of the Interior Harold L. Ickes and approved by the Bituminous Coal Division. Defendants or respondents desiring to waive public hearings must file applications with the Division within 15 days after their receipt of complaints or orders initiating the proceeding. Applications must describe fully the transactions which were in violation of the act or regulations, state whether or not other violations have been committed, consent to the imposition of penalties, state the amount of the tax which under the Coal Act may be levied for violations and meet other requirements.

Code memberships have been revoked and taxes under the Coal Act required to be paid for wilful violations of the Coal Act and regulations involving the sale of coal below minimum prices as follows: Chester

USES ½ AS MUCH GREASE ON

SCREEN BEARINGS

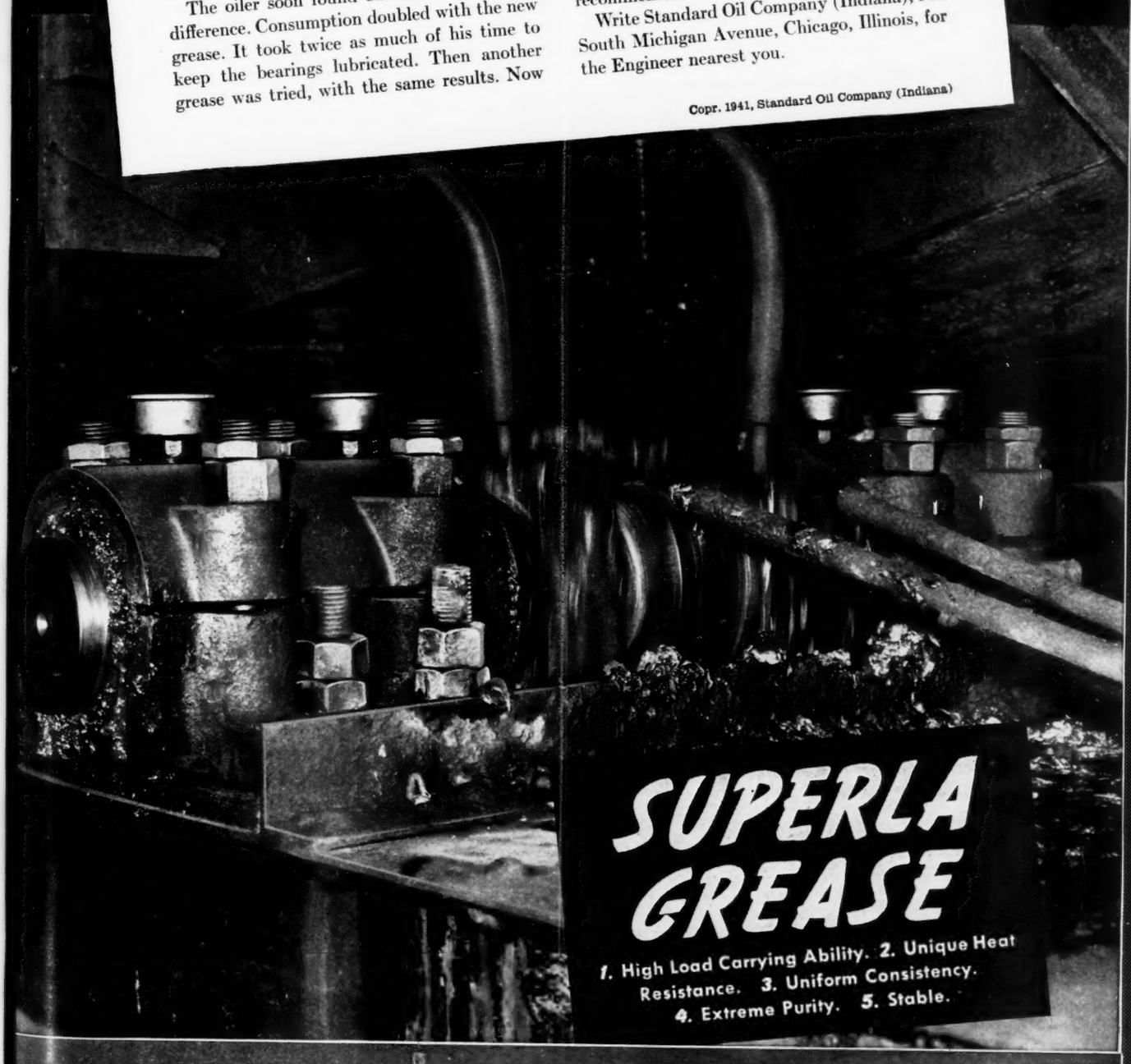
● ECCENTRIC BEARINGS on a dewatering screen had operated for a number of years on Superla Grease. These bearings had given so little trouble that the mine management decided that any grease could be used. A conventional type grease was substituted for Superla.

The oiler soon found out that there was a difference. Consumption doubled with the new grease. It took twice as much of his time to keep the bearings lubricated. Then another grease was tried, with the same results. Now Superla is back on the job, consumption is normal, and the oiler isn't wasting time.

Capacity operation may make it necessary to change some of the lubricants you are using. But don't waste time experimenting. Let a Standard Oil Engineer make his recommendations. Then watch maintenance and lubricating costs drop when you use the products he recommends.

Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago, Illinois, for the Engineer nearest you.

Copr. 1941, Standard Oil Company (Indiana)



SUPERLA GREASE

1. High Load Carrying Ability. 2. Unique Heat Resistance. 3. Uniform Consistency. 4. Extreme Purity. 5. Stable.

STANDARD OIL COMPANY (INDIANA)

LUBRICATION ENGINEERING...LUBRICATION ENGINEERING...LUBRICATION ENGINEERING...LUBRI

RING...LUBRICATION ENGINEERING...LUBRICATION ENGINEERING...LUBRICATION ENGINEERING...LUBRI

Tedrow, Shoals, Ind., $56.19; Dale McCoy, McCoy Coal Co., Des Moines, Iowa, $193.16; City Coal Co., Wheeling, W. Va., $166.83; Peterson Coal Co., Deerfield, Ohio, $902.60; Joel Jones, French Lick, Ind., $547.11; Log Creek Coal Co., Lynnville, Ind., $2,388.63; John F. Owens, Estella, Okla., $508.37; T. E. Luman, Roseville, Ohio, $43.67; Katherine Hoffmaster, $850.28; Morris & Campbell, Hymera, Ind., $1,213.51; Greier & Schlachter, Adyeville, Ind., $76.10; New Citizens Coal Co., Centerville, Iowa, $413.98; Urbandale Coal Co., Des Moines, Iowa, $158.06; J. C. Roman, Morgan, Pa., $796.35; Princess Pat Coal Co., Middleport, Ohio, $79.47.

An application has been granted for reinstatement of the code membership of the Little John Coal Co., Indianapolis, Ind., upon finding that the producer has paid $2,304.54 in taxes under the Coal Act and has otherwise complied with the revocation order.

Cease and desist orders have been issued restraining the Owl Coal Co., Sullivan, Ind., and R. B. Hiddleston, H. & M. Coal Co., Estella, Okla., from violations. Both cases involved shipment of sizes of coal larger than that specified for the minimum prices charged. Evidence showed that the producers took steps to correct the situations when their attentions were called to the violations.

Cease and desist orders have been issued restraining the following companies from selling coal below minimum prices: Beech Grove Coal Co., Byesville, Ohio; Carterville Coal Co., Carterville, Ill.; Edwards Brothers Coal Co., Oskaloosa, Iowa; McCammon Brothers Coal Co., Sullivan, Ind., and John E. Brown, Nowata, Okla.

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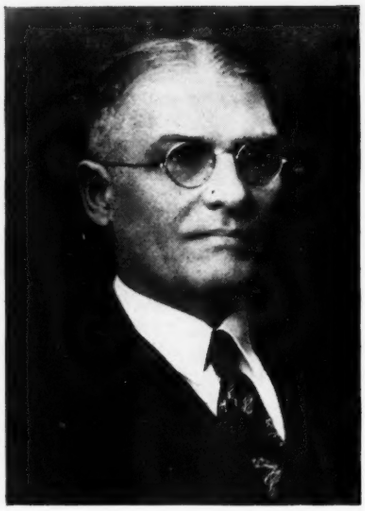
Personal Notes

FRANK C. CAROTHERS has been advanced to the vice presidency of the Puritan Coal Corporation, Puritan Mines, W. Va. He also will continue to fill the post of general manager. Prior to his connection with the Puritan organization he was general superintendent for the Pond Creek Pocahontas Co.

LINDSAY COBB, foreman at the Martwick mine of the Greenville Coal Co., has become foreman of the Stirling Coal Co.'s Daniel Boone mine, near Madisonville, Ky., where 15 miners were killed Oct. 27 in an explosion. Mr. Cobb, brother of Ray Cobb, Earlington, mine superintendent of the St. Bernard division of the West Kentucky Coal Co., succeeds William Compton, one of the blast victims.

GEORGE W. DOFFING, head research analyst of the petroleum and coal industries for Scudder, Stevens & Clark, New York City investment counsel, has been appointed price executive in charge of the fuel section of the Office of Price Administration. He succeeds M. QUINN SHAUGHNESSY, who was drafted from the Securities and Exchange Commission to organize the OPA fuel staff. Mr. Shaughnessy, who had served with the Petroleum Administrative Board, laid the framework of OPA policy for stabilizing fuel prices. He will continue with OPA as a consultant.



F. F. Jorgensen

GEORGE P. FITZ, president and general manager, Ajax Coal Co., has been reelected president of the Hazard Coal Operators' Association. W. E. PRITCHARD, general superintendent, Algoma Block Coal Co., is again vice president, and A. E. SILCOTT has been renamed secretary-treasurer.

CHARLES S. GUTHRIE, general manager, Harlan Fuel Co., was elected president of the Harlan County Coal Operators' Association at its annual meeting. Other officers named are: vice president, R. E. LAWSON, general manager, Cornett-Lewis Coal Co.; secretary, GEORGE S. WARD (reelected).

WALTER HORNSBY has resigned as general mine foreman for the Glogora Coal Co., Glo, Ky., and accepted the post of mine inspector for the Seventh District, Department of Mines and Minerals, Pikeville, Ky. He succeeds FRANK RHODES, who has become mine superintendent for the Majestic Collieries Co., Majestic, Ky.

TRUMAN E. JOHNSON, vice president, Hutchinson Coal Co., Fairmont, W. Va., has announced the termination of 20 years' service with the company as of Dec. 1. He will go into business for himself.

F. F. JORGENSEN, formerly manager of operations of the Monongahela Rail & River Coal Corporation, Fairmont, W. Va., took up new duties on Nov. 1 as labor commissioner for the Northern West Virginia Coal Association.

R. F. KIRKWOOD has been appointed superintendent of the Bankhead mines of the Cane Creek Mining Co., Bankhead, Ala. He had been acting superintendent.

W. L. LYONS, safety director for the Kingston Pocahontas Coal Co., Hemphill, W. Va., is the new president of Post No. 1 of the National Mine Rescue Association. He was selected at the annual meeting, Nov. 22 at Bluefield, W. Va., attended by members of mine-rescue teams from the Logan, Greenbrier, Pocahontas and other coal fields.

CHARLES M. O'BRIEN has been appointed head of the fuel division of the Better Business Bureau of St. Louis, Mo. For the last seven years he has been connected with the Mt. Olive & Staunton Coal Co.

RUSSELL E. REILLY has been appointed superintendent of the Wyodak Coal & Mfg. Co., Gillette, Wyo., vice Joseph F. Peters, deceased. Mr. Reilly has been an employee of the company since 1908, in recent years in charge of water and property.

H. J. RICHARDSON, who had been mine foreman at Bankhead No. 1 mine of the Cane Creek Mining Co., Bankhead, Ala., has been made mine foreman for both Nos. 1 and 2 mines.

GEORGE K. SMITH, president, Sunday Creek Coal Co., Columbus, has been elected a director of the Ohio Chamber of Commerce, representing natural resources production.

OSCAR F. TANGEL, who had been added to the technical staff of Battelle Memorial Institute, Columbus, Ohio, has been assigned to the division of materials beneficiation, where investigations of coal preparation and ore concentration methods are in progress. He has had wide experience as metallurgical engineer with several metal-mining companies in the Western States. He is a graduate of Lafayette College and the Montana School of Mines and has studied in Germany.

DARIUS A. THOMAS, president of the Montevallo Coal Mining Co., Aldrich, Ala., has been elected chairman of District 13 Bituminous Coal Producers' Board. He succeeds the late Herbert S. Salmon.

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Obituary

E. H. TRACY, 42, who for 17 years was assistant secretary of the New River Coal Operators' Association, Mount Hope, W. Va., died Nov. 3 in a hospital at Baltimore. At the time of his death he was assistant clerk in the West Virginia House of Delegates.

THOMAS E. SNYDER, 83, retired general manager and vice president of the Hazle Brook Coal Co., died suddenly Oct. 29 at his home in Hazleton, Pa. He started with the company as a breaker boy at the age of 13.

JAMES B. WATSON, 90, for many years president of the Atlas Coal & Mining Co., Rich Hill, Mo., died Nov. 4 at the home of his daughter, in Kansas City, Mo.

MISS WINIFRED COLLINS, 54, superintendent of the community center of the Tennessee Coal, Iron & Railroad Co., died Nov. 5 in a Birmingham (Ala.) hospital following a brief illness. Born in Knoxville, Ill., she received B.S. and Ed.B. degrees from the University of Chicago. She entered the service of T.C.I. in 1917 as superintendent of its department of social science and had been superintendent of the company's community service center since 1937.

RALPH B. HAVERSTICK, 55, treasurer of the Harmon Creek Coal Corporation, Pittsburgh, Pa., died Nov. 4. He had been associated with the coal industry for more than 35 years.

FREDERICK L. HAMMOND, 67, president and chairman of the board of the Cadomin Coal Co., Cadomin, Alberta, Canada, died Nov. 16 in a hospital. He was engaged in

colonization schemes across Canada when he became interested in coal mining. In 1917 he opened the first mine of the Cadomin Coal Co. and continued as president and manager of the company until 1930, when he retired temporarily. In 1937 he again became head of the coal firm and was active in its management until his death.

ELI CLEMENS, 64, electrical engineer for the United States Coal & Coke Co., Gary, W. Va., died Nov. 17 at Grace Hospital, Welch, W. Va., after an illness of more than a year. He took an active part in the opening of the company's mines at Lynch, Ky., as well as those at Gary.

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Convention Program Plans Being Formulated

Plans are taking shape for the American Mining Congress convention and equipment exposition to be held at Cincinnati, Ohio, April 27–May 1, it was shown at a meeting of the national program committee, headed by J. Noble Snider, vice-president, Consolidation Coal Co., held Nov. 12 at Cincinnati. The schedule approved provides for morning and afternoon sessions on the first four days, and in addition two special sessions for strip mining to be held in a separate meeting room in the Music Hall. The committee also recommended a special session for anthracite.

Continuance of the Miners' Exhibit was recommended as an encouragement of initiative among coal-mine employees and to spread new ideas. It was suggested that ten prizes be awarded by the exhibit committee, as in the past, but that a Defense Bond be substituted for the $10 cash award; also that a certificate, suitable for framing, be presented to each winner. It was felt that the feature should be called "Home-Made Gadgets," however, instead of Miners' Exhibit.

Based on the compilation of recommendations of the State committees, 15 papers for the deep-mining operating sessions were selected, as follows:

Mechanical Loading—Large vs. small operating crews, effect of unit tonnage on over-all mine efficiency; description of mining methods, pillar recovery, and service haulage.

Conveyor Mining—Conveyor methods, mechanical and hand loading, gathering belts; economics of conveyor mining in various operating phases.

Surface Preparation—Water clarification, heat drying, dust control; slate picking, handling and refuse disposal.

Equipment Maintenance—Shop practices, location of shop, frequency of equipment overhauling, records and inspections to prevent breakdowns.

Underground Power—Underground distribution for mechanical mining; a.c. cable vs. surface line with borehole.

Face Operations—Cutting, drilling and blasting as affecting efficiency and quality for loaders and conveyors.

Safety—Methods to reduce accidents in mechanized operation, résumé of general safety practice; ways of impressing safety on men.

Roof Support—Physical characteristics of mine roof, causes and prevention of roof falls.

Ventilation—Sealing vs. ventilating mined areas.

Management—Organization for mechanical operation.

Vocational Education—Training for foremen, supervisors, machine operators and maintenance men.

National Economic Problems—Two papers on subjects of national importance, such as priorities, defense, etc.—titles and authors to be selected later.

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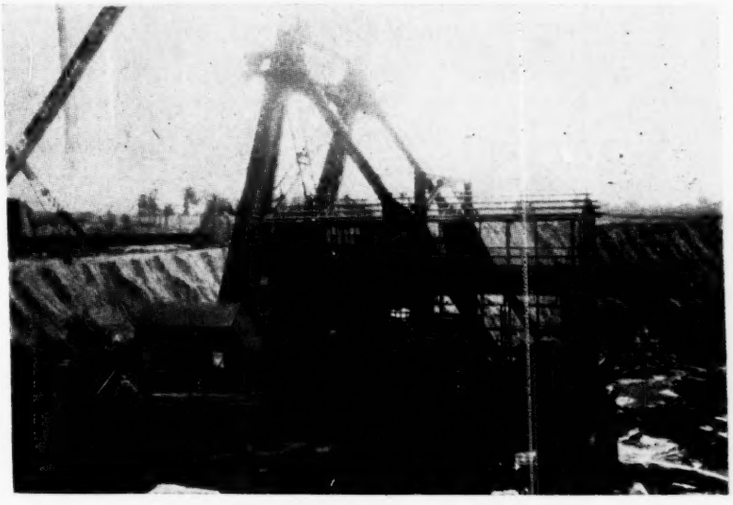
Tram Line to Warrior River

A tram line has been completed from the Porter mine of Adams, Rowe & Norman, Inc., Adamsville, Ala., to the Warrior River. As a result the company is shipping a substantial tonnage of steam and coking coal by barge on the river. E. J. Rowe is president of the company.



Convert Strip Shovel to Dragline

United Electric Coal Cos. is changing the big Marion 5600 shovel at Fidelity No. 11 mine, DuQuoin, Ill., into a dragline.

ABC JUTE BRATTICE CLOTH

IT'S CHEMICALLY TREATED TO Resist FUNGI AND FLAME

★Tried and proved by actual test to stand up best under most severe conditions.

● Widely used, ABC Jute Brattice Cloth demonstrates its ability to dependably resist

(1) FUNGI—(the many types found in some mines) because of a compound which is formed by the chemicals used

(2) FLAME—the best-known flame resistant chemical treatment is given ABC jute so that this Brattice Cloth can be fully depended upon

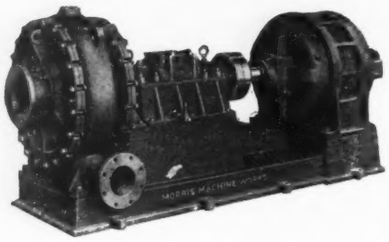
In addition to these features ABC Jute Brattice Cloth will not shrink even in a very wet mine, thereby assuring full width at all times.

Leakage of air is kept at a minimum with ABC Jute because our cloth is woven from heavy yarns, loomed skillfully and uniformly throughout. With ABC Jute Brattice Cloth you may be sure of well ventilated working places.

American BRATTICE CLOTH CORPORATION
WARSAW, INDIANA
Agencies in all Mining Centers

The MORRIS HYDRAULIC COLUMN

News of interest to Centrifugal Pump Users

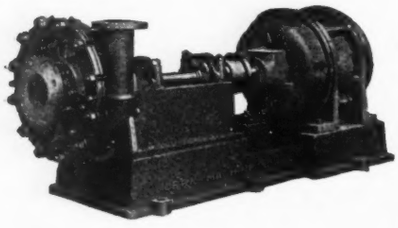


For longer service from your coal and sand pumps

Material-handling pumps are naturally subject to severe wear. Impellers, wearing rings, shaft sleeves, shell liners are continuously abraded by the grinding and scouring action of the material being handled. The result . . . usually early and frequent replacement of parts or complete new units.

For three generations, Morris has been developing designs and materials to retard this wear. Today, when new equipment is so hard to get, this long experience is at your service to help you in the essential conservation of your present pumps.

If you are troubled with rapid wear of your centrifugal pumps . . . whether Morris or other design . . . consult the Morris engineers. They will advise you authoritatively and frankly how you can get longest service from your pumping equipment and how you can maintain highest possible efficiency.



MEMBER

For authoritative recommendations on any pumping problem, write to Morris Machine Works, Baldwinsville, N. Y. Representatives in principal localities. *Export Office*, 50 Church St., New York.

Coal Division of American Mining Congress, Reciting Its Findings, Maps New Drives

SAFETY must keep pace with efficiency, declared R. L. Ireland, president, Hanna Coal Co., opening the annual conference of the Coal Division, American Mining Congress, Pittsburgh, Pa., Nov. 21. All conclusions in regard to efficiency, he added, must be closely scanned in the light of safety.

From now on, the U. S. Bureau of Mines will take a new line of action. After years during which it has assisted the industry solely by acting in an advisory capacity, it is now adding the inspection of mines to its other duties. The American Mining Congress and the coal industry have urged consistently that the original relation between industry and the Bureau would be productive of more good than is likely to result from venturing into the inspectional field. However, the Congress of the United States holds a different opinion, and the industry, said Mr. Ireland, will cooperate loyally in helping the Bureau to develop its new role under the immediate direction of J. J. Forbes.

In the evening at the banquet, acting as toastmaster, Mr. Ireland reverted to the same matter, and said that the sage advice of the Bureau, if duly followed, might save the industry two dollars for every dollar expended. Work on the Mining Congress committees also brought big returns, especially to those fortunate enough to be associated with them, as he had been.

At the morning session of the division, the committees met at separate tables and discussed their several activities during the past year and planned their schedules for the next twelve months. In the afternoon, they presented informal reports.

In the absence of F. G. Smith, general superintendent, Sunday Creek Coal Co., Jerome White, mining engineer, Mildred Co., described the work of the committee on materials for roof support, causes of roof falls and their prevention. The subcommittee handling the first subject, headed by Reamy Joyce, district sales manager, Wood Preserving Corporation of America, has already published its data on wood preservation, but further details on the use of concrete and brickwork for roof sustension still remain incomplete. A. E. Long, engineer, Clearfield Bituminous Coal Corporation, had collected field data on roof falls.

To H. B. McNary, consulting engineer, New River Co., fell the chairmanship of the subcommittee on roof sealing. He reported that his company and the Island Creek Coal Co. had painted extensive stretches of roof of which only about 1 per cent had since failed. Thus far, the experience available was insufficient, in his opinion, to furnish ground for any declaration on the value of paint as an agent for roof protection.

After H. P. Greenwald, supervising engineer, experimental coal mine section, Bureau of Mines, had presented the results of the experiments on the expansions and deteriorations of the roof at his mine (*Coal Age*, p. 102 of this issue), P. H. Price, State geologist of West Virginia, reported that inquiries into the cleat directions of coal and rock in the coal fields of West Virginia showed surprising regularity in these features. Questioned by R. D. Hall, engineering editor, *Coal Age*, he declared that the minor fractures of the roof might crisscross the cleats of the coal seam, but that the pattern of the major joints conformed with accuracy to the pattern of the coal measures. He believed that the orientation of the fracture of the roof had a bearing on the completeness and safety attained in extraction of coal.

T. F. McCarthy, general superintendent,

"When you finish your golf, Mr. Hagen, maybe you'd like to help load these cars."

Consolidation's No. 32
Two views of Consolidation Coal Co.'s new No. 32 plant . . . a modern, up-to-the-minute unit fitted with the latest in equipment.

A Modern Coal "REFINERY"

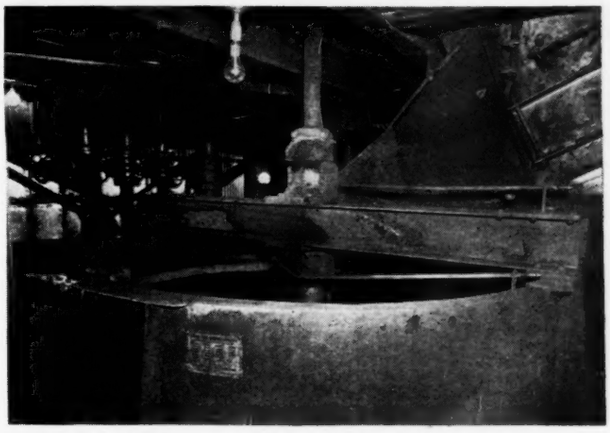
● Designed to provide wide flexibility in the processing of six basic sizes of washed and blended coal, this modern coal "Refinery" assures the customer that he will receive a product properly sized for maximum performance with his burning equipment.

To thoroughly clean the particular coal being handled at No. 32, a Chance Sand Flotation System was installed together with proved Crushing, Screening and Conveying equipment. An oil vapor system dust-proofs all sizes to suit individual customer requirements. The plant handles 5,000 tons daily of Pittsburgh Seam coal.

This new plant is another Fairmont-built "Refinery" which profitably and successfully handles the specific job for which it was designed.

Fairmont, in addition to the Chance Sand Flotation System, provides the American Pneumatic Separator for jobs where "dry cleaning" is indicated.

Consult with Fairmont engineers for an analysis of your requirements.



Installation view—Chance Sand Flotation System.

TRADE MARK REGISTERED

FAIRMONT MACHINERY COMPANY

FAIRMONT, W. VA.

HELP FOR MINES SPEEDING UP DEFENSE PRODUCTION

HOLMES EQUIPMENT
WIDELY USED

DANVILLE ROBT. HOLMES BROS. ILLINOIS

● Elevator Buckets, Conveyors Pans, Screening Equipment, Hoists, Rope Drums, Sheaves, Special Lowering Chutes, Special Machinery . . . all designed and constructed to give maximum service advantages. If you are in need of equipment such as Holmes has so successfully produced, write, wire, or phone—we will give you our immediate cooperation.

HOLMES MAKES emergency repairs —a phone call will bring a Holmes representative at once—phone 1430.

ROBT. HOLMES & BROS.
INCORPORATED
DANVILLE ILLINOIS

Mechanization Demands Simplex Jacks!

TO get the most from loaders, coal cutters and conveyors, you need Simplex Mine Jacks to cut moving and set-up time.

Low in height, light in weight, yet rugged and of full 5-ton lifting capacity on cap or toe lift, these jacks get out more coal for you because they help miners to quickly move machinery and get it running again.

No. 85-A shown in Camel Run Mine of Warner Collieries Company is 17' high, lifts a full 10' for average seams; No. 84-A, 14' high with 7' lift is recommended for thin seams and No. 86-A, 20' high with 10' lift for thick seams.

Made by the makers of Simplex Adjustable Mine Roof Jacks and other jacks, described in Bulletin Mines-41—sent on request.

Templeton, Kenly & Co., Chicago, Ill.
California, Pa. Princeton, W.Va.
Better, Safer Jacks Since 1899

Simplex Jacks
dependable and efficient
Lever Type for toe and cap lifting.
Hydraulic for easier cap lifting.
Screw Jacks for economy.

Clearfield Bituminous Coal Corporation, then introduced the subcommittee chairmen of his committee on conveyor mining. Carel Robinson, consulting engineer, Charleston, W. Va., who heads one of these subcommittees, stated that room-entry conveyors might last for a period measured in hours to three, four or even seven years. One belt, costing $4 a foot with a top cover well calculated to resist wear, was destroyed in two years because the fabric was weak and yielded to decay in the moist atmosphere of the mine. Its wearing surface still had 90 per cent of its life intact, but the whole investment of $52,000 on this 13,000-ft. belt was liquidated in the short space of two years.

Studies are being made of the supervisory organization of loading operations, declared S. M. Cassidy, manager, Weirton Coal Co. Ninety per cent of the success in mechanical loading is said to rest on organization, and for this reason the committee decided to find to whom each worker on the crew reported. To what official, for instance, should the wire crew be held responsible and why? The "why" did not seem to be so easy to ascertain as was desired.

Two Conductors Better

A report on material and labor costs in servicing haulage track was presented by R. V. Clay, vice president, Hanna Coal Co., and that on carrying capacity of conductors and underground wiring for conveyor-mining systems by C. C. Ballard, electrical and mechanical engineer, New River Co. F. L. Stone, engineer, mining section, General Electric Co., presented two related charts showing losses in power due to insufficient capacity of conductors (*Coal Age*, December, 1940, p. 71) and A. L. Johnston called attention to the principle that it is more economical to install two conductors of any certain number of circular mils than to install a single conductor of capacity equal to the sum of the capacities of the two smaller conductors, because with two conductors the temperature does not rise as much as with one, and the electric resistance accordingly is lower. Heat due to overlapping of conductors on reels also increases electrical resistance.

Screen efficiency, asserted T. W. Guy, consulting engineer, Charleston, W. Va., is now being studied by the committee on surface preparation of which he is chairman, the dewatering and drying project having been completed. The committee proposed during the coming year to study crushing efficiency, kind of rolls, their diameter and speeds, and rate of feed, with Mr. McAleer, McNally-Pittsburg Manufacturing Corporation, as subcommittee chairman.

Another study under way, announced G. R. Delamater, vice president, W. S. Tyler Co., is the means of controlling feed to screens; use of heat on dewatering screens in drying of coal is another study under a subcommittee headed by C. P. Proctor, superintendent, Champion No. 1, Pittsburgh Coal Co.

Reporting for J. W. Woomer, general manager, Warner Collieries Co., R. D. Leitch, chemical engineer, U. S. Bureau of Mines, stated that 26 factual reports regarding mine drainage have been prepared, distributed and approved. The committee on stream clarification had considered the establishment of an inquiry into methods available for recovering fine sizes of salable coal from sludge and results obtainable. In the anthracite region, progress had been made in the recovery of minus 35-mesh coal, and it is hoped that eventually it may be possible to clean and sell even the minus 200-mesh, thus freeing streams of and from the anthracite region of their burden of coal silt.

Under W. E. Hausman, mining engineer, H. C. Frick Coke Co., a committee on ventilation was established with Lee Barrett, superintendent, Library Shops, Pittsburgh Coal Co.; C. L. Tinker, La-Del Conveyor & Manufacturing Co., and Cloyd E. Smith, editor, *Mechanization*, to prepare information on ventilation as non-technical as possible for practical mining men. Subjects suggested were mechanism of operation, sealing of working areas, cleaning of aircourses and the financing of such maintenance.

Under Preference Rating Order P-56, declared W. A. Nelson, administrator of mine priorities for the Office of Production Management, at the banquet, all plants that remove something from the ground, whether from water or open pit, except mineral water, placer gold or oil and gas, are entitled to certain priorities under that pro-

Three Generations of Mining Engineers

Top—The late Oscar A. Veazey, first mine inspector, State of West Virginia. Middle—His son, Victor S. Veazey, chief engineer for the McKell Coal & Coke Co. for 12 years. Bottom—The latter's son, Victor S. Veazey Jr., transitman for Koppers Coal Co., Kopperston, W. Va.

vision. Every "mine" is given a serial number under which applications for priorities must be made, but serial numbers are not afforded to a mine with less than ten men, for it is expected that such mines will get what they need from other sources.

If an operator cannot get what he wants by shopping around, he is entitled to use an A-8 rating, and if there is a breakdown, he can get an A-1-a rating, but this last should be used very sparingly. By the tenth of the month reports of receipts of materials and supplies must be made to the State Mining Coordinator for the preceding month. If a mine is closed down by the State for lack of material to comply with State regulations, the operator can obtain relief under an A-1-a rating just as if there had been an actual breakdown.

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New Morgan Strip Operation Nearly Ready to Produce

The new stripping operation of the F. C. Morgan Coal Co. near Bryant, Ill., is expected to be ready to produce coal by Christmas. The company has a sizable acreage of No. 5 Fulton County coal under lease and contract, and is constructing a spur of slightly more than a mile from the C. B. & Q. R.R. to its yard tracks. The plant is designed for a maximum capacity of 1,800 tons per day and an average of 1,500 tons.

The tipple will embody several new features, including rescreening booms for all sizes larger than screenings. The entire tonnage will be washed except the extra large domestic egg (6 to 8x12 in. size) which seems to be popular in this territory. This coal will be hand picked when it is loaded. During most of the time, however, the entire tonnage will be crushed to a maximum top size of 7 in. and all will run through the washing plant. The latter was designed and furnished by the McNally-Pittsburg Mfg. Corporation.

Haulage from the strip pit to tipple will be handled by 25-ton trailer unit hauled by Dart tractors. Sales will be handled by Walter Bledsoe & Co.

This new operation is No. 9 for the Morgan company, which operates three other strip plants in Illinois, two in Indiana, one in Kentucky, one in Ohio and one in Pennsylvania. Fred C. Morgan is general manager; Harrison Eiteljorg is assistant general manager, and Otis Bledsoe is chief engineer. Mr. Bledsoe has supervised construction of the Fulton County operation.

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Getting the Figures Straight

In connection with the organization of Southern Coal Producers, Inc., p. 78, *Coal Age*, November, 1941, it was stated: "The directorate will be made up of one member from each of the 14 districts, a director-at-large and additional directors elected on the basis of tonnage. For each 10,000 tons or fraction thereof produced annually the district will be entitled to one additional director." H. S. Homan, temporary secretary of the association, informs us that the tonnage entitling a district to an additional director should have been 10,000,000.

JIM SLIM says:

"FOR LOWER COST COAL CUTTING, PARTNERS THREE . . . THE BOWDIL CUTTER BAR, CHAIN and ME"!

The new BOWDIL Cutter Bar . . . the new BOWDIL Chain . . . and JIM SLIM . . . there's an *unbeatable combination*, designed and built to whip the toughest coal cutting problems to be found. Why not let a BOWDIL representative demonstrate the superiority of these cost-cutting, coal-cutting items. The bar has been re-designed to give more rigidity . . . the Chain's been rebuilt to give more cutting efficiency, plus longer life. Working together, they form your first line of defense against excessive mining costs. Let our representative call on you, or write us for detailed data on each or all of them.

The BOWDIL Company
Canton — COAL CUTTING EQUIPMENT — Ohio

Jeffrey entry gathering conveyor driven through a DE LAVAL Worm Gear
DE LAVAL
FOR HEAVY DUTY DRIVES specify DE LAVAL WORM GEARS

The high efficiency and reliability of De Laval worm gears is especially valuable in continuous, 24-hour service. The efficiency approaches 97 per cent at some ratios and increases, rather than recedes, with use. Power is transmitted without vibration, chatter or shock. The only maintenance required is occasional inspection of the oil level in the casing.

The driven shaft can be extended to either right or left, or both, or either up or down, or both.

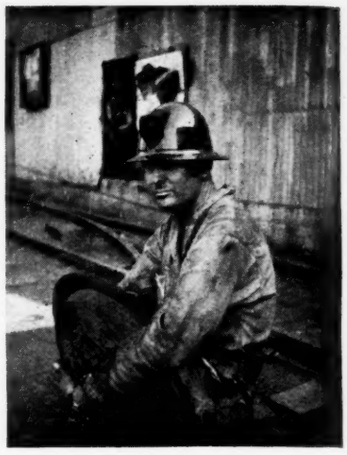
Ask for Booklet W-1130 on "Industrial Applications of Worm Gears"

DE LAVAL **WORM GEAR DIVISION**
of the De Laval Steam Turbine Co., Trenton, N. J.

COAL MEN ON THE JOB

Harry Bushong, chief electrician, Buckhorn mine, Consolidated Coal Co., Herrin, Ill.

Paul Kirk (left), chief electrician, Seymour Coal Mining Co., Herrin, Ill., with William Wooden and Emile Kemper.



Hazen Coleman, top foreman, Buckhorn mine, Consolidated Coal Co., Herrin, Ill.

F. R. Phillippi, vice president, Dye Coal Co., Cadiz, Ohio, with W. K. Richards, Kenneth Richards and Thomas Telfer, of office staff.

C. C. Conway, electrical engineer, Consolidated Coal Co., Herrin, Ill.

George Timmerman, top boss, Mt. Olive & Staunton Coal Co., Staunton, Ill.

B. F. McMillen (left), general superintendent, Dye Coal Co., Cadiz, Ohio, with Clem Henderson, superintendent, and a shovel crew.

Tipple force, Dyco No. 2 mine, Dye Coal Co., Cadiz, Ohio, with Fred Tipton, foreman.

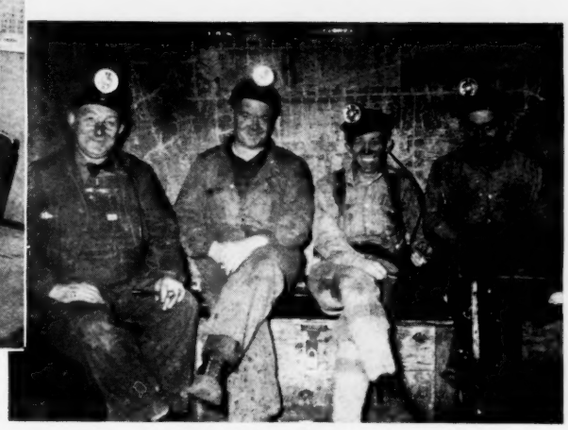
C. J. Denny (right), chief electrician, Dye Coal Co., Cadiz, Ohio, with G. M. Collins.

John Gross, tipple foreman, J. H. Somers Coal Co., Adena, Ohio.

Andy Shimble, mine foreman, J. H. Somers Coal Co., Adena, Ohio.

Henry McDowell, chief electrician, J. H. Somers Coal Co., Adena, Ohio.

J. O. Somers, general manager, J. H. Somers Coal Co., Adena, Ohio.



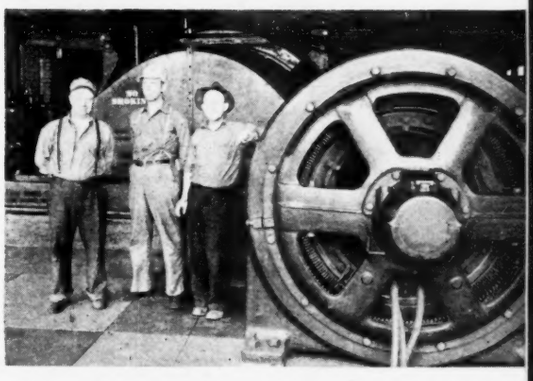
Okey Howard (left), general mine foreman, Dun Glen No. 11 mine, Hanna Coal Co., with John Sowers, assistant foreman, and a main-line motor crew.

A. D. Swecker, engineer, Powhatan Mining Co., Powhatan Point, Ohio.

P. R. Paulick, chief engineer, Powhatan Mining Co., Powhatan Point, Ohio.

Jerome Watson, safety director, Willow Grove No. 10 mine, Hanna Coal Co., Neffs, Ohio.

George Reynolds (right), chief electrician, Dun Glen No. 11 mine, Hanna Coal Co., with Elmer Mieskowski.



Felix A. McParland (right), top foreman, Powhatan Mining Co., Powhatan Point, Ohio, with C. E. Frankhauser and John Newhart, hoisting engineers.

H. P. Dickson, chief electrician, Powhatan Mining Co., Powhatan Point, Ohio.

Charles Wiseman and L. M. Thrush, face boss, Powhatan Mining Co., Powhatan Point, Ohio.

Dain Bragg, face boss, and Jess Hallam, section foreman, Powhatan Mining Co., Powhatan Point, Ohio.

Jay Littlepage (right), director, Ohio Reclamation Committee, St. Clairsville, Ohio, with Frank Chappell, Jefferson Co., Hopedale, Ohio.

George Johnson (left), dispatcher; M. J. Mechling, safety director; David Elerick, mine foreman; and Walter Willison, Powhatan Mining Co., Powhatan Point, Ohio.

BY EDITORS ON THE JOB

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Coal Company Wins Appeal On Unjust Enrichment

In its first decision involving application of the unjust enrichment tax to a coal company the U. S. Board of Tax Appeals has held that the Norwood-White Coal Co., Des Moines, Iowa, did not pass the tax to its vendees, the evidence establishing that the stipulated increases in selling prices were merely to absorb increased labor costs.

In this case the company did not pay the code-member tax imposed by the 1935 Coal Act, which became effective Nov. 1, 1935. The Commissioner of Internal Revenue held that the unjust enrichment tax applied. On Oct. 1, 1935, prices of Norwood-White's coals were increased, and realization for 1935 was $0.09386 more than for the six-year average 1929 through 1934. However, the proof showed that the miners' wages were increased on Sept. 30, 1935, and during the period Oct. 1 through Dec. 31, 1935, wage payments amounted to $125,226.74, compared with $108,798.35 figured on the scale in effect prior to Sept. 30. Sales increased by $14,482.06, but labor costs increased by $16,428.19.

•

Appanoose Holds Second Carnival

Appanoose County, Iowa, held its second annual Coal Carnival on Nov. 4. There was a large turnout from the local community as well as from surrounding territory. The principal speaker was Governor George Wilson, introduced by John K. Valentine, Centerville, a director of the Iowa Coal Institute.

•

New Preparation Facilities

Elk Horn Coal Corporation, Wayland, Ky.—Contract closed with Roberts & Schaefer Co. for Stump pneumatic coal-cleaning plant to be constructed in existing tipple; capacity, 80 t.p.h. of ¼-in. x 48-mesh raw coal; to be completed about Feb. 1, 1942.

Page Coal & Coke Co., Pageton, W. Va.—Contract closed with Roberts & Schaefer Co. for complete screening and crushing plant to handle 6x⅜-in. coal at 250 t.p.h.; to be completed about Dec. 18.

Stevens Coal Co., Spring Mountain Colliery, Jeanesville, Pa.—Contract closed with Wilmot Engineering Co. for a 7-ft. Hydrotator to prepare No. 4 buckwheat; capacity, 40 tons of clean coal per hour.

Ames Mining Co., Elmo, W. Va.—Contract closed with Kanawha Mfg. Co. for Kanawha-Belknap washer for stove coal; capacity, 50 t.p.h.

Stover Smokeless Coal Co., Stonewall, W. Va.—Contract closed with Kanawha Mfg. Co. for preparation equipment for four-track tipple, consisting of Parrish type shaker screens; lump, egg and stove picking tables and loading booms; refuse and rescreen conveyors, and refuse bin; capacity, 200 t.p.h.

Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.—Contract closed with Jeffrey Mfg. Co. for two 3-compartment Baum jigs; capacity, 200 t.p.h. 2x0-in. raw coal feed.

Mrs. Kathleen Meagher Wyse

Transit Woman

Miss Kathleen Meagher on various occasions headed the party which located 190 of the approximately 200 oil wells in the Benton (Ill.) oil field. Trained by her father, George Meagher, mining engineer for the New Orient mine of the Chicago, Wilmington & Franklin Coal Co., she was a member of the engineering staff of that company this summer. Aiming for unmined pillars of coal, she scored all hits. But young J. H. Wyse, recently with Gulf Oil Co., Port La Crux, Venezuela, proved more attractive to Kathleen than an engineering career in the Benton oil fields. They are now at home in Fort Worth, Texas.

•

New Firm Runs Cameo Splint Mine

A new West Virginia mining company, known as the Cameo Coal Mining Co., has been incorporated. Walter J. Tuohy, president of the Globe Coal Co., Chicago, is president of the new company, and J. Clifford McChristie, of New York City, is secretary-treasurer. The company has taken over the Cameo Splint mine of the Cameo Splint Coal Co., Cameo, W. Va. The Globe Coal Co. will act as exclusive sales distributor of the mine. Production has been about 700 tons daily, but present plans are to mechanize the operation and increase output.

•

Observes Silver Anniversary

With the completion of 25 years of progress, Air Reduction Co., Inc., New York City, issued late in October a 54-page book giving a detailed description of the activities of the five units composing the company. The purpose of the book is to acquaint stockholders and others with what the organization does and details the uses to which its products are put.

Among important aspects of the company's business the book notes that it is a major producer of oxygen, nitrogen, hydrogen, acetylene, calcium carbide, carbon dioxide, helium, neon, and arc-welding machines and equipment. The five Airco operating units are: Air Reduction Sales Co., National Carbide Corporation, Wilson Welder & Metals Co., Inc.; Pure Carbonic, Inc.; and Ohio Chemical & Mfg. Co.

Thomas S. Lowther Mining Institute Studies Altimeters, Priorities and Defense

DEFENSE crowded out technique of mining at the Thomas S. Lowther Mining Institute meeting, Nov. 22, at Indiana, Pa. In the closing paper, E. P. Jaggard, mining, mechanical and electrical engineer, C. A. Hughes & Co., compared the altimeter to the voltmeter and declared that a true understanding of the ventilating conditions in a mine could not be obtained with the sole use of the anemometer, the only measuring instrument except the water gage in use until recent years. Even now the altimeter is little used in central Pennsylvania, yet no electrician would attempt to perform his duties without a voltmeter.

The value of the altimeter lies in the ease and accuracy with which its readings can be made. It can be read to an accuracy of 2 ft. in elevation, which is equivalent of 0.03 in. of water, provided the value is checked with another altimeter read synchronously at the base station or office. There is no need to follow any one heading and take pressures in sequence, though it is helpful to construct a chart showing the gradient of pressures from point to point, for where the inclination is greatest, there the loss of power is at a maximum, exhibiting conclusively where work needs to be done to save dollars in fan operation. It is not necessary to take altimeter readings in the smaller splits because the interest lies in the speedy air with its high resistances. Altimeters are used regularly by the ventilation engineer of the H. C. Frick Coke Co., declared Mr. Jaggard, and no new splits may be established without his approval.

Sidelights on Mining

No industry progresses without the assistance of other industries, declared A. W. Gauger, head, School of Mineral Industries, Pennsylvania State College. At his institution, the advances in one line of research throw light on the work being done in another. He illustrated this with the chemistry of the blast furnace, which illustrates the action of the mineral matter in coal under the high temperatures of boiler and domestic furnaces.

Permeability problems in the coal measures are illuminated by the studies being made into the use of water to drive oil out of the oil sands by the process known as "pressuring" with wells 300 ft. apart between points of entrance of water ("water to water," as the jargon runs). Such water must be free of lime, rust or occluded air or the pores will clog.

Importance of Coal

Problems of defense and their relation to coal mining were discussed by Heath S. Clark, president, Rochester & Pittsburgh Coal Co. The importance of the coal industry to the production of steel becomes manifest when it is stated that 2,850 lb. of coal is needed to make a ton of iron. Normally, a ton of scrap is used per ton of pig iron, but industry is using so much of its scrap for construction that it has become scarce and more pig iron must be used. Steel shortage is further increased because the use of more pig involves more traffic on the Great Lakes, for which ships must be built. Aluminum manufacture also is dependent on coal, for there is a shortage of hydroelectric current. The St. Lawrence canal project will not be built in time to carry any of the load of present war needs.

"Hangover" After War

For the last seven years, the unions have maintained a good record for contract observance. In the previous seven, there were 774 strikes recorded and perhaps 1,000 including those not recorded. It is to be hoped that we are not entering a period when strikes in violation of the agreement will be frequent. The other strikes were a "hangover" from the first World War, when capital made big profits. In this war, labor appears likely to be the profiteer and have the "hangover." We are told inflation is just "around the corner," but must remember that the same was said of prosperity and we waited from 1929 to 1940 for its to arrive. Let us hope inflation is as far off as prosperity proved to be, added Mr. Clark.

Coal operators should not use their priority rights excessively or there will be no priorities, said Richard Maize, Secretary of Mines, State of Pennsylvania, who is acting as State Coordinator of Mines of the Office of Production Management. Mines should use their scrap or provide a bin for it and one for their copper. An operator can turn in his scrap copper and get an equal weight of finished copper in return. Mr. Maize's address followed closely on the lines of Dr. Wilbur Nelson's address before the Coal Division, American Mining Congress, recorded in this issue, p. 124. G. I. Steinheiser, president, acted as chairman at the meeting and as toastmaster at the banquet.

•

Minerals Yearbook Records What Coal Did in 1940

In earlier, perhaps happier, years the coal operator cared only for coal statistics; today he is wondering how he is going to get alloys that will keep him supplied with parts that will run with minimum wear and heat, so the "Minerals Yearbook, Review of 1940" ($2, cloth), as published by the U. S. Bureau of Mines, has a new interest and new function which it admirably fulfills. Nevertheless, the coal production is the main consideration for the coal man.

Restricting the purview to bituminous coal and lignite, exports in 1940 rose from 11,590,478 net tons in 1939 to 16,465,928—a 42 per cent increase. Production rose 15.3 per cent. Consumption in the United States increased 14 per cent. Average number of men employed rose 2.1 per cent. Electric power plants increased their effective use of the coal they consumed 1.4 per cent and the railroads 0.9 per cent.

Anthracite production decreased, according to the record, 2,737 tons in 1940 from that in 1939, but the value of the product rose $18,315,000. Exports increased 78,000 tons, or about 3 per cent, and imports of foreign anthracite decreased 163,000 tons, about 55 per cent. Consumption fell 1.5 per cent.

Much detail is given of bituminous coal

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cleaned in 1936 and 1938 showing raw coal, clean coal and refuse, and the year book gives the usual data regarding deep-mine mechanization. "Lignite in 1939" has a section to itself. Lignite production grew in 1939, but in an unimportant degree. In 1940, byproduct coke output increased 26 per cent, being the highest on record, and coke from beehive ovens totaled 3,057,825 tons—5 per cent of total coke tonnage. Fuel-briquet production in 1940 rose 17.8 per cent in tonnage and 11 per cent in value over 1939, and packaged-fuel output rose 32 per cent and its value 28 per cent. Three more packaged-fuel plants were active at the close of 1940 than in 1939. Peat production increased 26 per cent and 43 per cent in value and, as a result of the war, the American peat production was much greater than the imports: 70,097 as against 21,689 tons.

•

Prizes Offered for Articles On Compressed Air

Cash prizes are to be awarded for the best articles on compressed air in a nation-wide contest for industry to be conducted by the Compressed Air Institute beginning Dec. 1, 1941, and closing June 1, 1942. Fourteen cash awards will be given. These will include a first prize of $100, three $50 prizes, ten of $25, and as many additional awards of $25 as there shall be contestants who submit material acceptable for use in technical journals.

Articles are to be judged according to the usefulness to the industry of the idea submitted, originality of text, value of text to the greatest number of industries, and technical accuracy and completeness with which the subject is treated. Subject matter may deal with any phase or aspect of compressed-air application, including its production, transmission or uses. Any type of pneumatic process or equipment may be described. Any process using compressed air alone or in combination with other power will be suitable material.

All contest presentations should be mailed to C. C. Rohrbach, secretary, Compressed Air Institute, 90 West St., New York City.

•

Technical and Scientific Aids Wanted in Federal Service

An examination has been announced by the U. S. Civil Service Commission to recruit technical and scientific aids for various government agencies. Men and women are needed to do research and testing in radio, explosives, chemistry, physics, metallurgy and fuels. The jobs pay from $1,440 to $2,000 a year. Among the government agencies that are expected to utilize the employment lists set up as a result of this examination are the Bureau of Mines and the Bureau of Standards. The War and Navy departments also have vacancies—the War Department in its Quartermaster Corps and the Navy Department in its laboratories.

No written test will be given. Applicants will be rated on their education and experience. Applications will be rated as soon

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as possible after they are received at the Commission's Washington office until June 30, 1942. However, since many of these positions are connected with the national defense program, persons who are qualified for and interested in these positions are urged to apply at once. Full information and application forms may be obtained from the Civil Service Commission's representative at any first- or second-class post office, from the U. S. Civil Service Commission in Washington, D. C., or from any one of the Commission's district offices.

•

Illinois Preparation Engineers Debate Technique and Sales

Control of preparation, anti-freeze treatment, and complaints held the spotlight at the November meeting of Illinois Coal Preparation Engineers and Chemists, held at Tom's Place, DeSoto, Ill. On the subject of ash in coal, it was agreed that uniformity is preferred to an irregular ash content, even though the average percentage is lower. Another desirable characteristic of a satisfactory coal is uniform percentages for the various size fractions that make up the blended whole. These fractions should be uniformly distributed through the shipped product.

In the field of surface-moisture retention by washed coal, one producer having coal with an inherent moisture of 8 percent calculates the added surface moisture to be about 1½ percent for the 2x1¼-in. size. Smaller sizes carry increasing quantities down to minus ¾-in., which retains from 9 to 12 percent added surface moisture. Experience with wetting agents for decreasing surface moisture by reducing the surface tension of water was varied. One mine using a centrifugal dryer found no difference in surface-moisture retention between untreated coal and coal sprayed with a wetting agent. Another mine reported a one-third decrease in surface moisture for coal treated with a wetting agent and passed over a shaking screen.

Freezeproofing Results

Both dry and liquid calcium chloride were reported satisfactory as anti-freeze agents. One property used dry flake with fair results. One sackful was scattered about the corners and doors in the bottom of the car. Added quantities were distributed through the coal, using a total of 8 to 10 lb. per ton, the point being that if the coal once started to slide it would all run out. Because common salt is cheaper, it is to be tried this winter. At this mine, spraying the inside of railroad cars with oil was found to be ineffective. Another mine obtained best results by buying a concentrated solution of calcium chloride and diluting it with water to the desired point. It was found that the solution used does not need to be so concentrated as to withstand zero temperature. There seems to be a rather wide band of concentrations that will give satisfactory results.

Considerable discussion revolved about complaints and what to do about them. The industrial customer knows how to burn coal and what to expect from it; his complaints are justifiable. But the household customer has not been educated. To some members, that seemed a formidable job. The same car of coal is "good" to one customer and "rotten" to another.

The chief cause of complaints, according to one man of long experience, is the fact that coal too frequently is "oversold" by ignorant, enthusiastic salesmen—especially green retail employees. Even mine employees are at fault. In one case a mine worker informed a visiting coal dealer that their coal ran 4 percent ash. The preparation engineer heard about it in time and spragged that bit of misinformation. "Only by complete frankness and square dealing can complaints be overcome," declared this man.

•

SPAB Rules Against Pipe Line

The battle by coal and affiliated interests against Petroleum and Solid Fuel Coordinator Harold L. Ickes' scheme to construct a 1,500-mile oil pipeline from Texas to New York seems to have been successful with the ruling by the Supply Priorities and Allocations Board that a priority rating will not be issued on 66,000 tons of steel tube that would be needed for the project. The board in September ruled against priorities for steel plate, out of which it was originally proposed to build the pipeline. Thereupon Secretary Ickes submitted a revised application calling for the use of seamless steel tubing for the pipe, the latter plan having just been rejected.

•

To Reopen Millstone Mine

South-East Coal Co., Seco, Ky., states that its mine at Millstone, Ky., which has been idle for two years, is to be reopened, employing about 100 men. Preliminary work is now under way.

Expansion by West Kentucky Co. Includes Two New Mines

An expansion program providing for opening two new mines and plans for several more, depending on conditions, has been announced by Hooper Love, president, West Kentucky Coal Co. The new operations—Hecla mine, near Earlington, and Poplar Ridge, near Sturgis — will be thoroughly modern. Orders have been placed for equipment and construction is proceeding under supervision of Davis Reed, chief engineer.

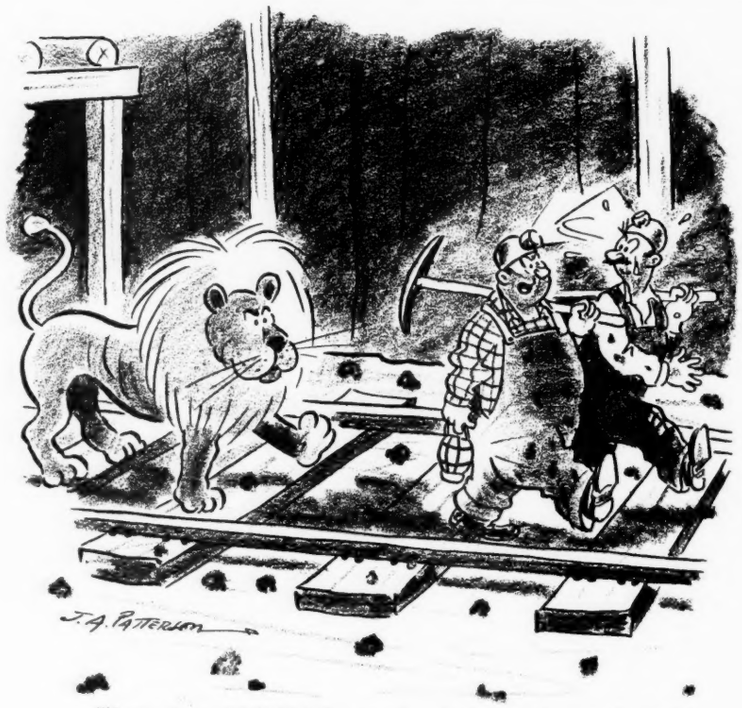
Operation at Hecla has already begun with a temporary tipple which will be replaced by a permanent structure within four months. One and one-half miles of private railroad is being constructed to serve the mine, and a daily output of 2,000 tons is expected to be achieved by next spring. Construction of 2½ miles of railroad and driving of the main entry slope at Poplar Ridge are scheduled to begin soon and be completed in 90 days. Output of 3,000 tons a day is to be reached by next autumn.

The new North Diamond mine, near Earlington, which started producing coal in October, is now loading more than 3,000 tons of washed coal per day.

•

Tri-State Coal Co. to Operate Southland Mine

A new corporation, the Tri-State Coal Co., has been organized to operate the old Southland Mining Co. mine, Henderson, Ky. J. C. Trader, Providence, Ky., purchased the mine property and equipment at a recent bankruptcy sale. Associated with him in the new company are W. B. Snow, Providence ice manufacturer, and Leslie Herron, Nashville, Tenn. N. E. Jones has been retained as mine superintendent and Dave Burch as mine foreman.



"You've been drinkin'? Who ever heard of a lion in a coal mine?"

Black Hawk Has New Tipple

With the completion of a new steel tipple, the Black Hawk mine of the Black Hawk Coal Corporation, situated 13 miles south of Terre Haute, Ind., resumed operation late in October. A new washer, in course of construction, is expected to be completed around the beginning of the new year. These structures replace the ones destroyed by fire Feb. 10 last. The mine now employs about 250 men and output is 2,000 to 2,500 tons daily.

•

New Mine for Pike County

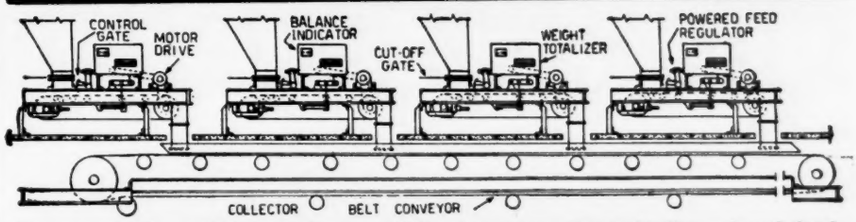
Pike County, Kentucky, is to have its first new mine since 1922 at Esco. The new operation, which is owned by the Utilities Elkhorn Co., was to have been opened early in November, but, according to John E. Bowman, general manager, inability to obtain essential equipment on time has delayed its start. The new plant is to produce about 300,000 tons of coal annually.

•

Republish Moore's "Coal"

A revision of Dr. Elwood S. Moore's "Coal, Its Properties, Analysis, Classification, Geology, Extraction and Distribution," has recently been reprinted by John Wiley & Sons, Inc. This 473-page 6x9¼-in. publication is particularly strong in its presentation of the origin, properties, geology of coal and in its description of the many fields here and elsewhere. Its references to mining, preparation and use are quite brief, though competent.

FEEDOWEIGHT



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DIESEL ELECTRIC SETS—Caterpillar Tractor Co., Peoria, Ill. Booklet Form 6905 explains the advantages of making one's own electricity with "Caterpillar" diesel electric sets, picturing many installations throughout the country.

HOSE—United States Rubber Co., New York City. Manual gives useful information about steam, water, suction, air, and oil and gasoline hose. Included are hints on handling and storage.

PROTECTIVE COATINGS—Protective Coatings, Inc., Detroit, Mich. Booklet contains complete information about all of the items in the Tocol line of protective coatings, including synthetics, specialties, rubber, etc.

PUMP APPLICATIONS—Pomona Pump Co., Pomona, Calif. Catalog gives information on pump adaptation for a wide range of duties under varying conditions, including case histories and practical drawings for laying in industrial pumps.

SAFETY EQUIPMENT — American Optical Co., Southbridge, Mass. Catalog describes items providing complete protection from head to ankles, including industrial goggles, Calobar lenses, Super Armorplate lenses, welding lenses, welding plates, welding helmets and hand shields, safety clothing, respirators, first-aid kits, etc.

STEEL CUTTING TOOLS—McKenna Metals Co., Latrobe, Pa. Catalog 42 covers standard Kennametal steel-cutting carbide tools and blanks. Typical applications of each style of tool are illustrated by line drawings, and halftones and information on specific examples of the use of Kennametal are included.

STEEL STANDARDS—Joseph T. Ryerson & Son, Chicago. Booklet contains official data on the S.A.E. and A.I.S.I. systems of steel identification. The systems are explained; direct comparisons of the equivalent or alternate steels are given in tabular form; complete analyses ranges for straight carbon and alloy steels of both systems are listed, and the average physical properties of S.A.E. and A.I.S.I. steels are presented in proper relationship.

WHEELED SCRAPER—LaPlant-Choate Mfg. Co., Inc., Cedar Rapids, Iowa. Booklet gives history and development of the CW-10 "Carrimor" scraper, describing such design features as the bowl, hydraulic system, wheels and brakes. A section is devoted to the TW-10 "Carrimor" scraper, which is the same machine with front wheel assembly for use with track-type "Caterpillar" tractors.

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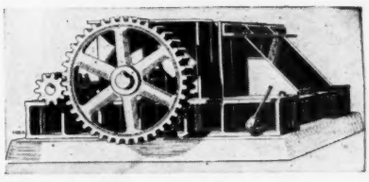
Drop forged for strength, Superior Swivel and Single Link Couplings are built to stand the gaff. No welds to let go with resulting wrecks. Superior Couplings on your mine cars will prevent accidents and reduce haulage costs. Order Superior Couplings for your replacements and specify them on new equipment.

DROP FORGED SWIVEL COUPLINGS

PITTSBURGH KNIFE & FORGE CO.

1716 Chateau Street
N. S., Pittsburgh, Pa.

A NEW VERSION OF AN OLD TYPE



"PENNSYLVANIA" TYPE "K" SINGLE ROLL COAL CRUSHER

With this advanced design, in rugged STEELBUILT construction, far more accurate sizing is possible to meet Code requirements through quick adjustability, in a range from ¾" to 8".

Further—real protection is provided by improved Safety Toggle Equipment, which quickly passes Tramp Iron, and instantly returns Breakerplate to crushing position.

Seven (7) sizes afford a capacity range from 50 to 1000 tons per hour.

Send for Bulletin No. 2006.

Also,— "PENNSYLVANIA" BRADFORD BREAKERS, BRADMILLS, GRANULATORS, HAMMERMILLS

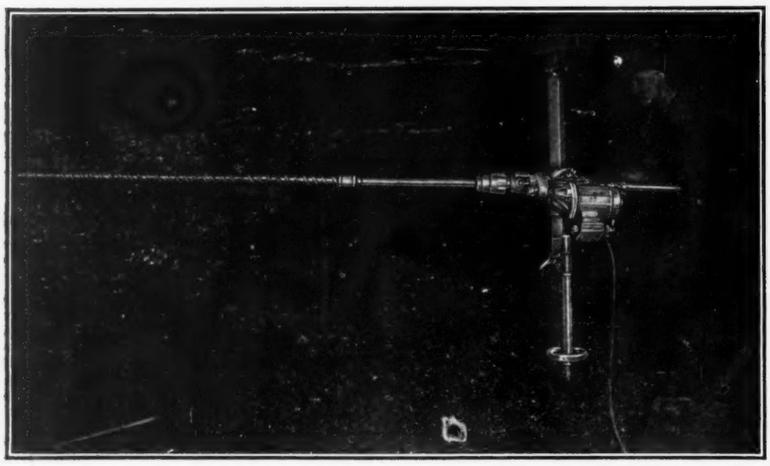
PUT YOUR COAL PREPARATION PROBLEMS UP TO US.

PENNSYLVANIA CRUSHER COMPANY

Liberty Trust Bldg. Philadelphia

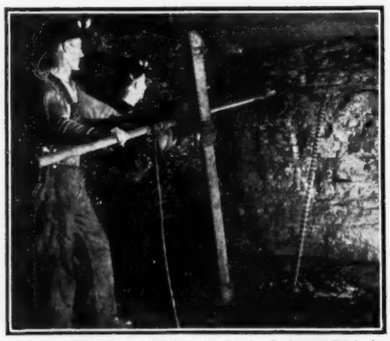
Representatives in Principal Centers.

ELECTRIC COAL DRILLS ESTABLISH RECORDS



6/10ths OF A CENT PER TON is the drilling cost in a West Virginia mine using 13 Post-Mounted CP Electric Coal Drills in Pittsburgh No. 8 Seam.

8 HOLES PER 25 FOOT PLACE,→ 10 places per seven hour shift is a typical performance of CP Electric Coal Drills in a Southern Illinois mine, Illinois No. 6 seam; depth of drilling, 7 feet.



DEPTH OF DRILLING, 9 FEET,↓ 65 holes per seven hours is the average in another Southern Illinois Mine.

7-1/2 FEET HOLES IN 2-1/2 MINUTES,↓ four holes per 24 feet place and nine places per shift is an every-day CP performance in the Eastern Ohio field.

MECHANIZED MINES CUT COSTS WITH HIGHER DRILLING SPEEDS

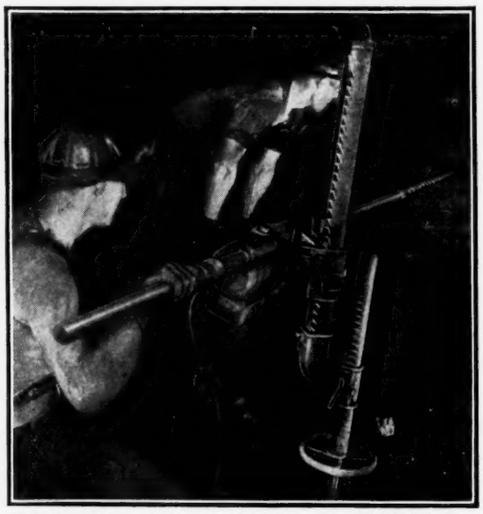
14 Models of Drills

In the Eastern Ohio, Southern Illinois, West Virginia and all other bituminous fields, and throughout the Anthracite Region, CP Electric Coal Drills are setting performance records that have brought drilling costs down to new lows.

With seven types of CP Post-Mounted Drills and four types of CP Hand-Held Drills, with permissible or open type motors for any voltage condition, there is a CP Electric Coal Drill, Post-Mounted or Hand-Held, for every seam and formation. Write for literature.

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 6 East 44th Street, New York, N. Y.



7-1/2 FEET HOLES, 2-3/4" IN DIAMETER↑ are drilled in 3 minutes with CP Electric Coal Drills in a well-known Ohio mine.

CHICAGO PNEUMATIC

ELECTRIC COAL DRILLS

ALSO: Air Compressors, Pneumatic Tools, Electric Tools, Rock Drills, Hydraulic Aviation Accessories, Diesel Engines

POST-MOUNTED
HAND-HELD
ELECTRIC AND PNEUMATIC TOOLS FOR MAINTENANCE AND REPAIR

TO COMPETE WITH auto traffic at stop lights, trolley car "pick-up" was stepped up. Resulting overload on motors, operating under tough conditions, required *yearly* dismantling for repairs. Since being insulated with Fiberglas, motors have run *3 years* without failure, expected to run *4 more years!* Maintenance saving estimated at 40%.

Does this mean Fiberglas is a motor "Cure-all"?

THIS and many other spectacular examples of improved motor performance made possible with Fiberglas might lead to the conclusion in the minds of some that Fiberglas is indeed a motor "cure-all." This is especially true in these times of overworked equipment and resulting breakdowns.

However—we the makers of Fiberglas make no exaggerated claims that its use automatically corrects all motor failures. It must be properly incorporated into the design of the motor and its application carefully controlled to fully utilize these basic advantages.

Fiberglas has a considerably greater margin of safety than cotton and a demonstrated longer life under high temperature conditions than asbestos. This means that your present equipment, re-wound with Fiberglas, can better withstand excessive loads for abnormal periods of time without insulation failure.

Reinsulating Class A Equipment, Fiberglas permits a safe increase in horsepower output, because it allows higher operating temperatures.

Apply these two Fiberglas advantages to motors or generators, and, in general, you secure added protection against breakdowns—wise insurance in these days of continuous three shift production. Specify Fiberglas to your repair shop. Order Fiberglas-insulated equipment from your manufacturer. *Owens-Corning Fiberglas Corporation, Toledo, Ohio. In Canada, Fiberglas Canada, Ltd., Oshawa, Ontario.*

*T. M. Reg. U. S. Pat. Off

OWENS-CORNING

FIBERGLAS

Ask Anyone in Industry!

ALEMITE HELPS THE WORLD GO 'ROUND
HERE'S HOW WE SAVED 28 MAN-HOURS PER WEEK WITH OUR ALEMITE PORTABLE LUBRICATION UNIT
SAYS JAMISON COAL COMPANY

"And it Ended Bearing Failures on Mine Car Wheels, Loading and Cutting Machines!"

SAYS FRANK JENKINS, Superintendent of the Jamison Coal Company at Farmington, West Va., "Our Alemite Portable Lubrication Unit has saved us a lot of time and trouble. Actual time saving amounts to about 28 man-hours per week on mine car wheels, loading and cutting machines—*and there have been no bearing failures.* The safety factor is highly important, too—because, with Alemite Power Lubrication, the operator's hands are kept free of moving parts."

Many progressive mines have adopted portable service units similar to Jamison's, shown in the photograph. This particular unit includes two low pressure and one high pressure air-operated Alemite Barrel Pumps, and goes to machines in all parts of the mine—wherever lubrication is needed.

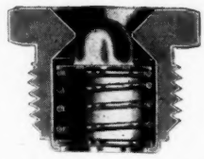
Alemite engineers have had experience with a wide variety of mine lubrication problems. Ask for a recommendation covering *your* specific requirements. Your letter will receive immediate attention. You are under no obligation.

Another Product of STEWART WARNER

MODEL 6687 ELECTRIC MINE CAR GUN

Clean, fast, positive, for modern mine car wheel lubrication; delivers up to 13 lbs. per minute, under pressure, direct from original drums; ample capacity to serve multiple outlets.

GIANT FLUSH TYPE FITTING



Designed for fast volume lubrication where protruding fittings cannot be used; free-flow type; positive shut-off.

ALEMITE

REG. U. S. PAT. OFF.

Industrial LUBRICATION

1838 DIVERSEY PARKWAY, CHICAGO, ILLINOIS • BELLEVILLE, ONTARIO

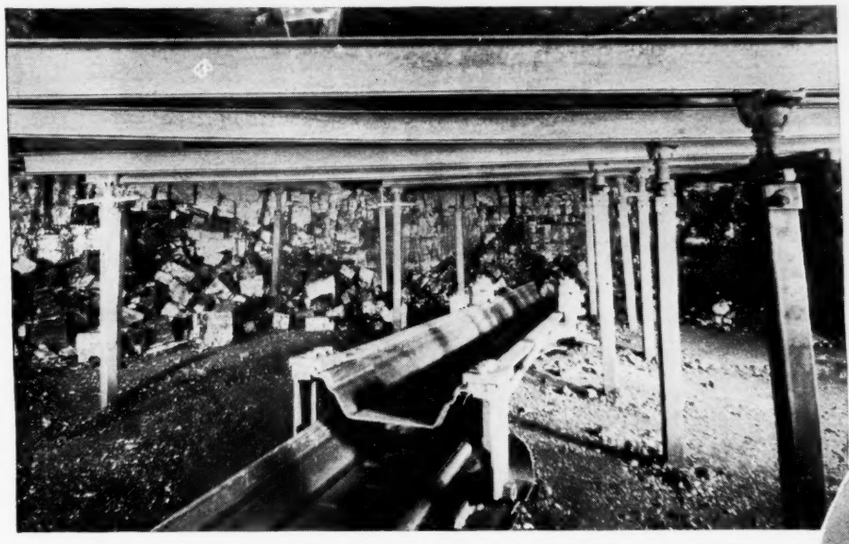
Steel meets the challenge

of faster, more efficient production

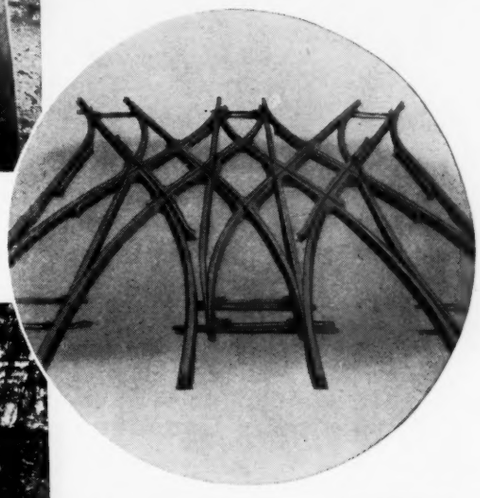
EQUIPMENT today must take a beating standing up. Capacity production and the use of heavier, high-speed machinery call for increased strength and durability everywhere in the mine.

Steel is the one material that continues to meet the test. Steel room timbers and posts speed production by enlarging the working area. Their greater strength promotes safety. Steel ties assure safe, efficient trackwork. And steel is economical in the long run. Long lasting, permanent where wanted, it can be re-used time after time.

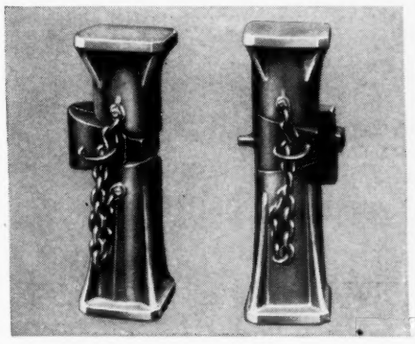
Carnegie-Illinois makes the right steel for every mine use. Why not consult a Carnegie-Illinois engineer on your next problem involving the use of steel? He will be glad to work with you, and there is no obligation for this service.



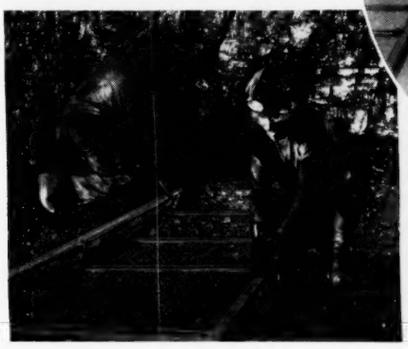
U·S·S STEEL ROOM TIMBERS pay for themselves by increasing production efficiency. Their longer spans mean fewer pit posts and allow a wider room, so that expensive cutting machines can be operated at full capacity. They are safe, too—will bend but not break.



U·S·S LORAIN SPECIAL TRACKWORK has proven its reliability for over fifty years. More efficient frogs, crossings and switches speed production by reducing derailments to a minimum. These items can be made to fit your special requirements.



U·S·S COLLAPSIBLE MINE POSTS provide positive roof control, give greater security in your longwall and room and pillar operations. They are easy to remove, and easy to retrieve because all parts are chained together. As they are practically indestructible, they can be used indefinitely.



U·S·S STEEL TIES assure safe and rapid movement of heavy equipment. Derailments are substantially reduced, as the track is held in permanent alignment. Shallow in depth, headroom is increased. They are easily laid with few tools, and may be moved from room to room in whole sections.

Use Steel for Safety

This symbol represents the highest quality, the finest metallurgical service.

CARNEGIE-ILLINOIS STEEL CORPORATION

Pittsburgh and Chicago

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
United States Steel Export Company, New York

UNITED STATES STEEL

Coming IN FEBRUARY, 1942

COAL AGE'S
31st ANNUAL REVIEW and PROGRESS NUMBER

★ Devoted to a Review of 1941 and forecast for 1942 . . . An issue *NO* active mining man will want to miss . . . Watch for it!

To our Advertisers . . . Review Coal Age's 1941 Accomplishments for you!

1. Circulation at an *all-time high*—12,381 Net Paid, October 1941 issue!

2. Continued gains above 1940—in total advertising pages!

3. More editorial pages than 1940—Increased reader value!

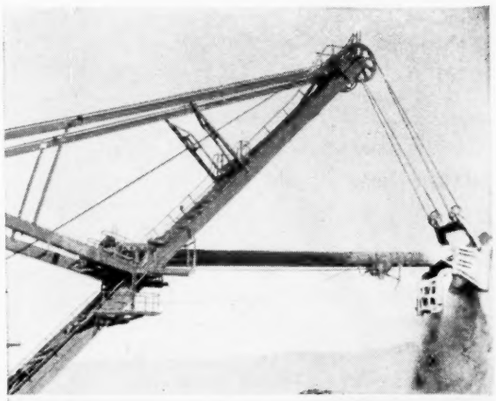
4. New, special editorial departments for greater reader service!

5. Strict adherence to an established, sound editorial purpose —"Accurate, progressive reporting of the operating, technical and business problems of the Coal Mining Industry"—Reader interest for advertisers, beyond parallel!

Be sure you plan a "Tell-All" advertisement in this February Issue.

FINAL FORMS CLOSE JANUARY 15th — RESERVE YOUR SPACE NOW!

EXTRA Tough . . .
EXTRA Flexible . . .
MONARCH PRE-FORMED
made from
2 KINDS OF WIRE



INNER WIRES ARE EXTREMELY FLEXIBLE. They're drawn in a special way to make them extra strong, extra pliable. They're improved plow steel too. They bend easily over your sheaves and drums. These wires are the reserve strength of Monarch Whyte Strand PREformed.

OUTER WIRES ARE EXTRA TOUGH. These wires are improved plow steel, specially drawn for outside service. They are Monarch Whyte Strand PREformed's "first line of defense"... that's why we give them a *tough* abrasion resisting skin. All wires are drawn in Macwhyte's own wire mill by experienced craftsmen.

And then to provide for EXTRA long life, every wire in Monarch Whyte Strand is thoroughly covered with a special lubricant which protects unseen, inside surfaces against corrosion and friction. This better wire rope is available from stock in the correct size, grade and construction.

Your equipment may be similar to hundreds of others. *Take advantage* of the experience of others having equipment like yours—ask for a Macwhyte recommendation of the rope that has proved itself to be the best for your equipment.

MACWHYTE COMPANY, *2931 Fourteenth Avenue, Kenosha, Wisconsin*

Manufacturers of wire rope to meet every need—left-&-right lay braided slings—Stainless Steel wire rope—Aircraft cable, Aircraft tie rods, and "Safe-Lock" Swaged Terminals.

New York · Pittsburgh · Coicago · Ft. Worth · Portland · Seattle · San Francisco
Distributors throughout the U. S. A.

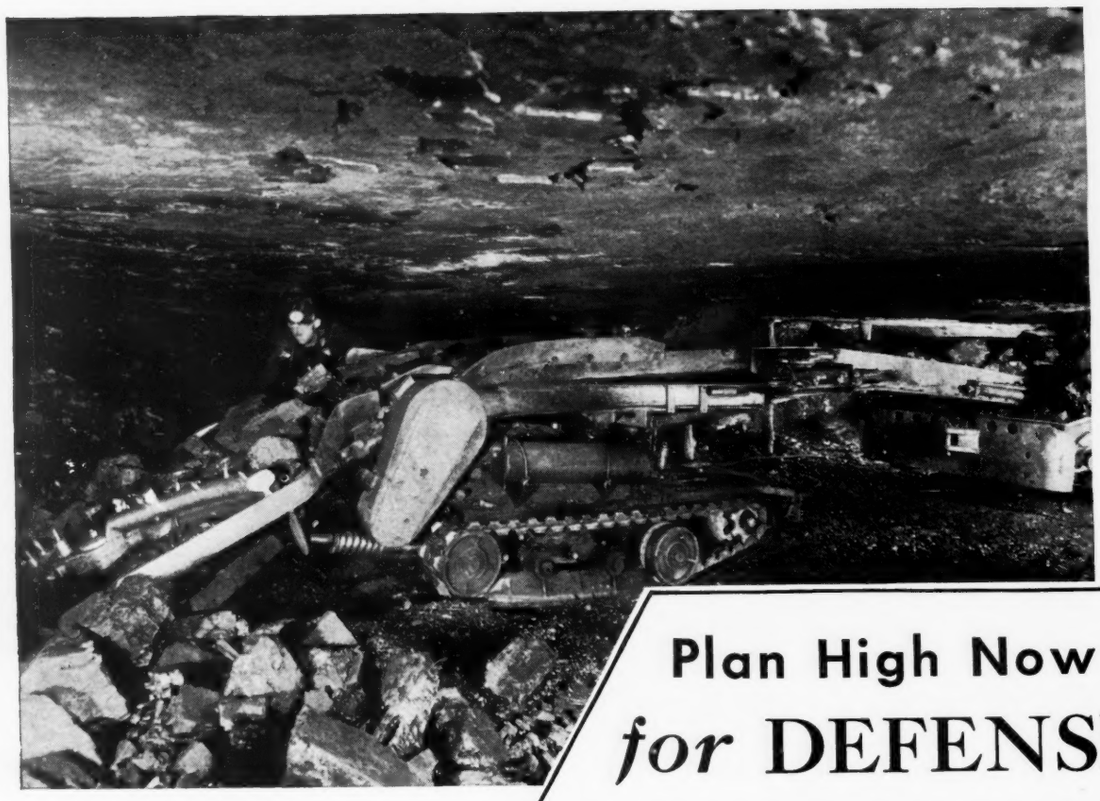
NO. 573-M

MACWHYTE MINING ROPES

TESTED INTERNALLY LUBRICATED PROVED

The correct ropes for your equipment

PRE-FORMED FOR BEST PERFORMANCE



● *Built by Joy Mfg. Co.*

Plan High Now *for* DEFENSE

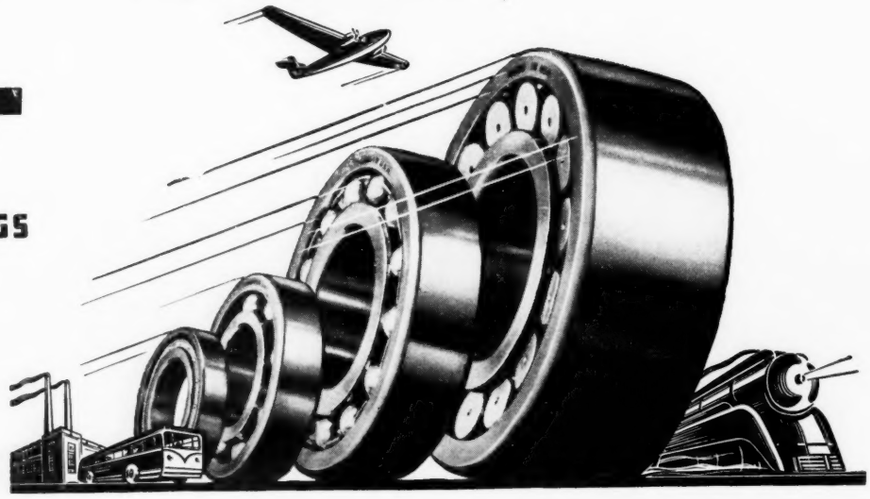
When mine operators plan for Coal Production these days, they're planning *high* with SKF-equipped machines. With this Joy 7-BU Loader, for instance, there are no stops for bearing trouble . . . no delays for fussy bearing adjustments . . . no time out for bearing repairs. Always there's smooth, continuous performance that enables you, as a mine operator, to get MORE done in *less time at less cost.* That's the real secret of Production these days, isn't it?

4948

SKF INDUSTRIES, INC., PHILA., PENNA.

SKF

BALL & ROLLER BEARINGS



Why Aren't *ALL* Motors Copperspun?

● It's an accepted fact that the one-piece rotor with windings centrifugally cast of SOLID COPPER makes the best squirrel-cage motor. For only in this rotor are the advantages of one-piece winding combined with the advantages of copper.*

Why, then, aren't Copperspun rotors used in *all* such motors? It's not because *only* Fairbanks-Morse has attempted to produce rotors of this type . . . the advantages are too widely recognized for that. It's because *only Fairbanks-Morse has succeeded.*

It took a great deal of time and money to find and perfect practical means of commercial production. But the result is worth the cost . . . F-M Motors with patented features available only in Copperspun rotors can help reduce operating and production costs. Their plus values challenge investigation if you desire the most for your equipment dollar. Write Fairbanks, Morse & Co., Dept. L-21, 600 S. Michigan Avenue, Chicago, Illinois. Branches and service stations throughout the United States and Canada.

• •

**Copper has a high melting point (2000° F as compared with 1100° F for aluminum), higher electrical conductivity, and better thermal expansion characteristics.*

FAIRBANKS·MORSE MOTORS

DIESEL ENGINES ELECTRICAL MACHINERY RAILROAD EQUIPMENT WASHERS-IRONERS STOKERS
PUMPS FAIRBANKS SCALES WATER SYSTEMS FARM EQUIPMENT AIR CONDITIONERS

For Dewatering and Drying

THE "C-M-I" CONTINUOUS CENTRIFUGAL

WILL GIVE THE LOWEST ULTIMATE COST ON ALL SIZES OF COAL BELOW ½ INCH

A FEW OF THE MANY USERS

Ayrshire Patoka Collieries Corp.
Staunton, Indiana

Central State Colleries, Inc.
St. David, Illinois

Delta Coal Mining Co.
Marion, Illinois

Hanna Coal Co.
Piney Fork, Ohio

Huntsville-Sinclair Mining Co.
Huntsville, Missouri

New Jellico Coal Co.
Morley, Tennessee

Peabody Coal Co.
Kincaid, Illinois

Pruden Coal & Coke Co.
Pruden, Tennessee

Standard Coal Co.
Fritchton, Indiana

Union Collieries Co.
Renton, Pennsylvania

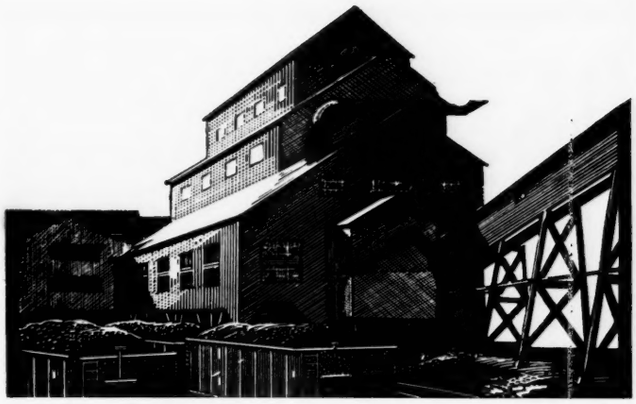
Utah Fuel Co.
Castle Gate, Utah

MODERN DESIGN FOR UPKEEP—

DEPENDABLE PERFORMANCE—

PROVEN IN SERVICE.

CENTRIFUGAL AND MECHANICAL INDUSTRIES, INC.
SECOND AND PRESIDENT STREETS ST. LOUIS, MO.



FREEZE-PROOF YOUR COAL WITH CALCIUM CHLORIDE

Calcium chloride can easily be applied at the tipple either with shovels or vibrating feeders that control pounds per ton right to the ounce.

Frozen cars not only tie up coal supplies during most critical cold-wave rushes but delay their use for important defense transportation.

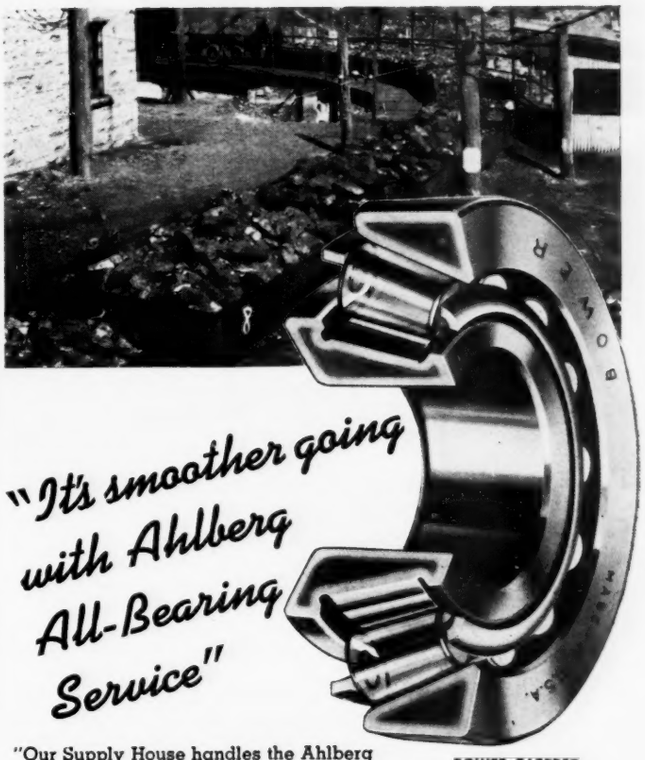
Railroads don't like frozen coal. It causes dealers unnecessary delays and unloading expense. It causes useless breakage and excess waste of fines.

True economy dictates calcium chloride treatment to prevent freezing in cars, to speed unloading and delivery and to deliver coal that is dust-proofed as well as freeze-proofed by the one operation.

Write for literature explaining methods of use.

CALCIUM CHLORIDE ASSOCIATION
4145 PENOBSCOT BLDG. • DETROIT, MICHIGAN

CALCIUM CHLORIDE
KEEPS COAL DUSTLESS



"It's smoother going with Ahlberg All-Bearing Service"

"Our Supply House handles the Ahlberg line of ball, roller and thrust bearings. We get quality replacements, as we need them, from a single source. Engineering counsel, too! It's a smooth service that's really helping our record!"

Many an operator will echo these sentiments, for Authorized Ahlberg Supply Houses are daily improving mine operating records through a complete bearing service, dependable and convenient.

Save expense and avoid uncertainty: count on Ahlberg All-Bearing Service for all you need in the modern anti-friction applications that lower maintenance costs and increase efficiency.

Ahlberg Supply Houses are served by 26 completely-stocked Factory Branches at strategic service centers.

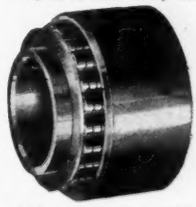
The Complete Ahlberg Line Includes
Needle Bearings—Ball Bearings
Thrust Bearings — Journal Roller Bearings
Tapered Roller Bearings
Ball Bearing Pillow Blocks
Ahlberg Ground Bearings
(For EXCHANGE on basis of 40% saving)

A useful, new, 96-page Ahlberg Bearing Manual will be sent you at your request. Write Ahlberg Bearing Company, 3089 West 47th Street, Chicago, Illinois.

And don't forget you save an extra 40% when you exchange your worn ball bearings for Ahlberg Ground Bearings.

BOWER TAPERED ROLLER BEARINGS
Exclusive refinement of design and "Super-Finish" permit permanent adjustment of Bower Tapered Roller Bearings at the time of installation and assure a longer life of smooth operation.

CJB MASTER BALL BEARINGS
Precision-manufactured by Ahlberg to even closer tolerances than S.A.E. Standards. Sizes and styles to meet every need.



RBC ROLLER BEARINGS
A complete line of straight and spiral roller bearings, machine tested at final inspection.

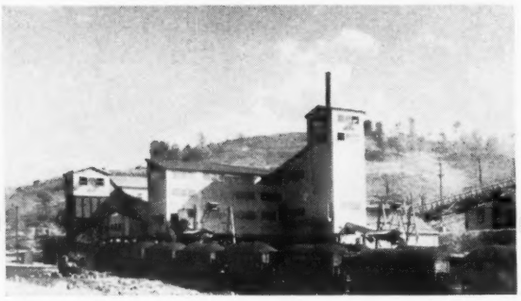
CJB BALL BEARING PILLOW BLOCKS
Precision bearings in sturdy housings with no-drag labyrinth seals and generous lubricant reservoirs.

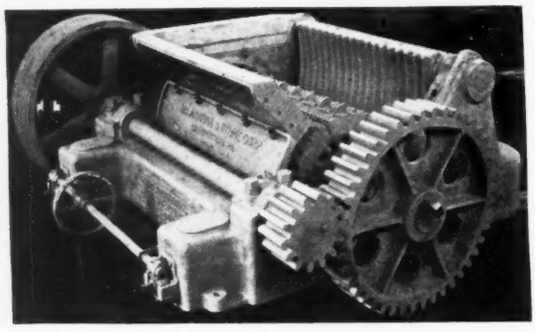
AHLBERG BEARING COMPANY
Manufacturers of CJB Master Ball Bearings
3089 West 47th Street - - - Chicago, Ill.

. . . for their NEW No. 32 Preparation Plant . . .

CONSOLIDATION COAL CO. *Chooses*

McLANAHAN CRUSHERS!





● In selecting equipment for their new, modern preparation plant No. 32, Consolidation Coal Co. naturally chose the most efficient units, both from a quality and productive standpoint, that are available today . . . and their choice for crushing equipment was a 36 x 54 and a 24 x 72 McLANAHAN Black Diamond!

This choice by Consolidation is further evidence of the record McLANAHAN has established as the source of long-lived, trouble-free, ever-productive crushers. For more than a hundred years, McLANAHAN has served industry. Countless preparation plants enjoy the cost-reducing benefits of McLANAHAN crushers . . . and McLANAHAN is eager to provide these benefits for you. With a size and type of crusher for every need, McLANAHAN is ideally suited to fill your crushing requirements. Call in one of our engineers today, or write for detailed descriptive literature.

McLANAHAN & STONE CORP. HOLLIDAYSBURG, PENNSYLVANIA

Tuffy
Mining Machine Ropes

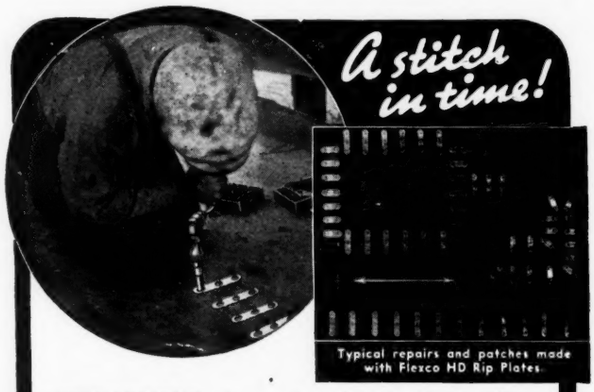
In all the machines of modern mining, these scientifically designed wire ropes outlast the field. Tuffies contribute to safety for mine workers, and replacements are less frequent. *Write for information.*

T-B

UNION WIRE ROPE CORPORATION
2130 Manchester Ave. Kansas City, Mo.
Tulsa • Houston • Chicago • Salt Lake City
New Orleans • Monahans • Portland • Ashland, Ky.

UNION Wire Ropes

The "ULTIMATE LOW COST WIRE ROPE"



Typical repairs and patches made with Flexco HD Rip Plates.

THOUSANDS of men in industrial plants, mines and mills all over the country are doing just what this man is doing. They are cutting costs by repairing conveyor belts with Flexco HD Rip Plates.

WRITE TODAY FOR BULLETIN F-100 that shows how easy it is to repair rips, to strengthen soft spots and to put in patches by using Flexco HD rip plates. The bulletin also shows how to make tight butt joints in both conveyor and elevator belts with Flexco HD Belt Fasteners. These fasteners are made in six sizes. Furnished in special analysis steel for general use and in various alloys to meet special conditions.

Flexco HD Rip Plate

Flexco HD Belt Fastener

FLEXIBLE STEEL LACING CO.
4638 Lexington St., Chicago, Ill.

FLEXCO HD BELT FASTENERS
Sold by supply houses everywhere

GET THESE FACTS!

On Coal Cleaning

R & S AND COMPANY

for BITUMINOUS COAL

Whether your problem is to clean fine coal or coarse coal . . . . to clean it wet or clean it dry, there is valuable information for you in the illustrated bulletins that R & S will send you without obligation. Get the details on the performance of **The IMPROVED LAUNDER TYPE HYDRO-SEPARATOR . . . The NEW HYDROTATOR . . . for fine coal washing or The STUMP AIR-FLOW CLEANER . . . for dry cleaning** fine coal. They will help you make your coal more marketable. Just ask for bulletins but write for them today, specify by number:

Hydro-Separator **No. 156,** Hydrotator **No. 157,** Stump Cleaner **No. 158**

ROBERTS and SCHAEFER CO.
307 North Michigan Avenue, Chicago
P. O. Box 865, PITTSBURGH, PA. — P. O. Box 570, HUNTINGTON, W. VA.

PERFORATED METAL
COAL MINING SCREENS
Manufactured exactly to your specifications
Any size or style screen, in thickness of steel wanted with any size perforation desired.
We can promptly duplicate your present screens at lowest prices.
CHICAGO PERFORATING CO.
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Canal 1459

HENDRICK
Carbondale **1600**
for
PERFORATED PLATE
Round—Square—Diagonal—Slot
Any perforation
HENDRICK MANUFACTURING CO.
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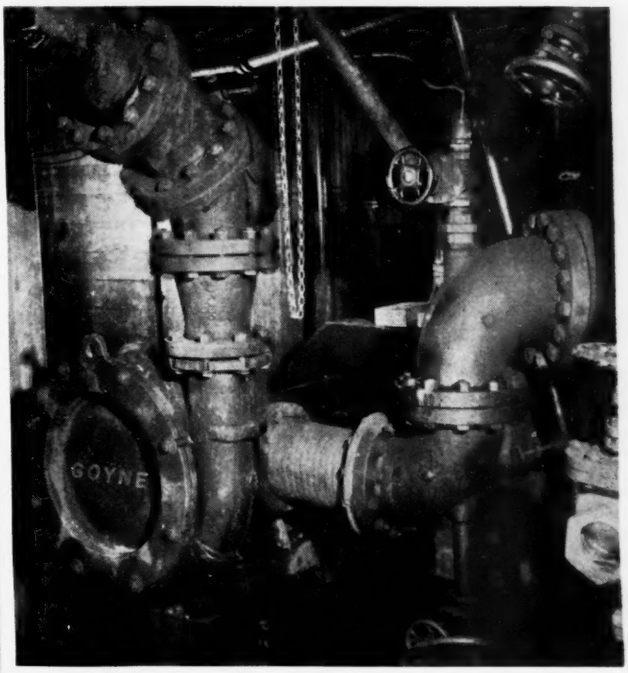
Sales Offices in Principal Cities.
Please Consult Telephone Directory.

GOYNE PROCESS PUMPS



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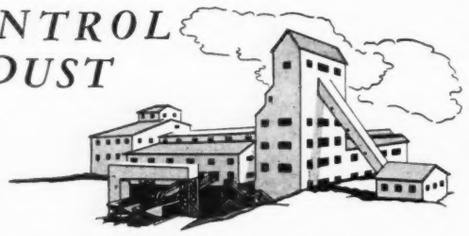

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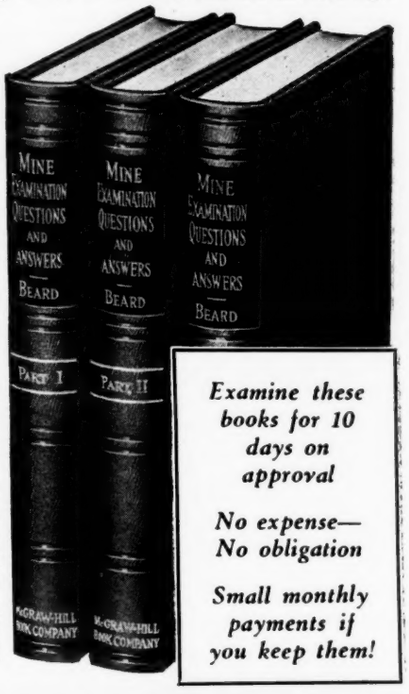

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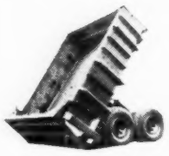

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24"	5	1/8"		1/32"
24"	4	1/8"		1/32"
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20"	4	1/8"		1/32"
18"	4	1/8"		1/32"
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375 ft. size of rope 1¼".
1—400 HP., Vulcan double cylinder conical Shaft Hoist 6' to 8' drums 2200 V.A.C. motor with starting equipment.
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HP.	Make	Speed	Type
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400	West.	1170	CW
260	Burke	600	EM-65
200	West.	690	CW-956A
100	West.	1750	
75	G.E.	850	——
75	West.	850	CW
60	Triumph	430	——

230 V. D.C. MOTORS

HP.	Make	Speed
400	Cr. Wh.	600
125	G.E.	1750 rpm.
100	West.	250
85	G.E.	530

230 V. D.C. MOTORS (continued)

75	West.	1700 rpm.
75	West.	475
75	Reliance	1750
50	West.	975 rpm.
50	West.	1700 rpm.

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300 kw. Cr. Wh. 720 rpm.
85 kw. G.E. 650 rpm.
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75 kw. G.E. 650 rpm.
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50 kw. G.E. 1150 rpm.
40 kw. West. SK, 1800 rpm.
35 kw. Cr. Wh. 900 rpm.

SQUIRREL CAGE MOTORS 3 ph. 60 cy.

HP.	Make	Speed
450	2200/220/440	600
400	2200/220/440	600
400	2200	500
400	220/440	514
350	2200/220/440	460
300	2200/220/440	460
300	West.	1150 rpm.
250	West.	1160 rpm.
250	West.	870 rpm.
200	West.	580 rpm.
200	West.	1160 rpm.
200	G.E.	1160 rpm.
150	West.	900 rpm. syn.
150	West.	1750 rpm.
100	West.	900 rpm. syn.
100	West.	1750 rpm.
100	West.	1200

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ROTARY DUMP
With weigh pan & scale.

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"Excellent for Shovels, Draglines & Hoisting"
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LOCOMOTIVES
3 Ironton Exide 6½ Ton Battery Locomotives 42" Gauge, also charging equipment.
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1—**Lidgerwood** Haulage hoist 60" drum 6000 ft. 1⅛" rope, 300 H.P. electrical equipment.
1—**Lidgerwood** Band Friction Haulage hoist, 60" drum 6000 ft. 1⅛" rope and 300 H.P. motor and control.
1—**Diamond** Haulage hoist 60" drum 5000 ft. 1" rope and 200 H.P. motor and control.
1—**Ottumwa** Haulage hoist 72" drum 8000 ft. 1⅛" rope with 300 or 600 H.P. motor and control.
1—**Vulcan** Cylinder Conical Drum Shaft hoist, 350 ft. 1⅜" rope with 400 H.P. motor and control.

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300 KW G.E. SYN. 275 V., 2300/4000 V., 3 Ph., 60 Cy., 80% P.F., 1200 RPM. Man. Switchg'r.
300 KW G.E. SYN 575 V., 2300/4000 V., 3 Ph., 60 Cy., 80% P.F., 1200 RPM. Manual Switchgear.
215 KW AL-CH SYN. 275 V., 2300/4000 V., 3 Ph., 60 Cy., 100% P.F., 1200 RPM. Man Switchg'r.
150 KW R.W. SYN. 275 V., 2200 V., 3 Ph., 60 Cy., 100% P.F., 900 RPM. Manual Switchgear.
100 KW WEST. SYN. 275 V., 2300 V., 3 Ph., 60 Cy., 100% P.F., 900 RPM. Manual Switchgear.

ROTARY CONVERTERS

500 KW G.E. SYN. 275 V., HCC, 6 Ph., 60 Cy., 1200 RPM, form P., 2300/4000 V. Transf'mrs.
500 KW G.E. SYN. 575 V., HCC, 6 Ph., 60 Cy., 1200 RPM, form P., 2300/4000 V. Transf'mers.
300 KW G.E. SYN. 575 V., HCC, 6 Ph., 60 Cy., 1200 RPM, form P, 2300/4000 V. Transformers.
200 KW WEST. SYN. 275 V., 6 Ph., 60 Cy., 1200 RPM, Bracket type, 2300/4000 V. Transformers.
200 KW R.W. SYN. 275 V., 6 Ph., 60 Cy., 1200 RPM, Pedestal type, 2300/4000 V. Transformers.
150 KW R.W. SYN. 275 V., 6 Ph., 60 Cy., 1200 RPM, Pedestal type, 2300/4000 V. Transformers.

LOCOMOTIVES

13-Ton WESTGHE, 250 V., 908-C mts., 36" Ga.
10-Ton GOODMAN, 250 V., 29-A Mts., 36" Ga.
8-Ton WESTGHE, 250 V., 906 Mts., 48"-36" Ga.
6-Ton WESTGHE, 500 V., 904-B Mts., 44"-36" Ga.
5-Ton WESTGHE, 250 V., 902-B Mts., 56½" Ga.
4-Ton WESTGHE, 250 V., 902-C Mts., 36" Ga.
4-Ton GOODMAN, 250 V., 32-A Mts., 44"-40" Ga.

Each unit listed above is owned by us and is available for immediate inspection and shipment.

WALLACE E. KIRK COMPANY
Incorporated
501 Grant Building Pittsburgh, Pa.

FOR SALE

2—200 KW **Westg. Syn. Motor Generator Sets** 600 V. D.C., Gen., connected to 290 H.P. Synch. motor 3/60/2200 and 900 RPM, with exciters and controls.
5—50 H.P. **G.E.** unused slip ring Type MTC **Hoist & Crane Motors**, 3/60/440 with new controls.
1—700 GPM, 200' hd. electric motor driven **Manistee Water Pump**, 3/60/2200.

IRON & STEEL PRODUCTS, INC.
13484 So. Brainard Ave., Chicago, Illinois.
"*Anything* containing IRON or STEEL"

BUY FROM A CONCERN BOTH FINANCIALLY AND MORALLY RESPONSIBLE

LOCOMOTIVES

Jeffrey: 10 ton, 500 volt, 44" gauge, 8 ton, 6 ton, and 4 ton, all gauges, 250 volt.

Goodman: All 250 volts.
1—6 ton, 33-I-4T, 44"
1—6 ton, 30B, 48" 1—5 ton.
1—5 ton, W-I-2, 36"

Westinghouse: All 250 volt.
1—4 ton, 902, 48" 1—13 ton, 102, 44"
1—904 c. 44" 500 volt.

G.E.: All 250 volt, 5 ton 825, 44"
6 ton 803, 44", as is 4 ton 1022, 44, as is
6 ton 823, 44"

MINING MACHINES

Jeffrey, 35B, 35BB, 29B, and 4—28A, 250 V. 29C with adjustable drop bar support.

Goodman, 12A, 12AB, 12AA, 12G3A.
1—212G3 250 volt and 2—112DA, 500 volt.
2—Permissible Type 12CA.

Sullivan, CE7, CE9, CE10, CR10 Low Vein and Shearing Machine, AC and DC.

SUBSTATIONS

275 volts, D.C.
1—150 KW **West.** M-G Set.
100 KW **West.** Rotary Connector
2—150 KW **Ridgeway** M-G Sets.
2—100 K **Ridgeway** M-G Sets.
1— 50 K **G.E.** M-G Set.
1—150 KW **G.E.** HCC Rotary Converter.

MINE FANS

ALUMINUM

36"—48" and 60" with adjustable pitch blades.

AERIAL TRAMWAYS * HOISTS * PUMPS * MOTORS * TRANSFORMERS * BOND WELDERS * RESISTANCE, COMPRESSORS * CAR RETARDERS * DUMPS SPEED REDUCERS * FIELD FRAMES * ARMATURES * GOODMAN HYDRAULIC SHOVEL * MOTOR STARTERS AND CONTROLLERS—AC & DC * DROP BAR SUPPORTS (Gooseneck), 29B and 29C * MINING MACHINE TRUCKS * SWITCHBOARDS * CIRCUIT BREAKERS—AC & DC * CUTTER CHAINS—Jeffrey, Sullivan, Cincinnati, and Bowdil * TRUCK SCALES * CONVEYOR HOISTS * COAL CRUSHERS, double roll 12"x16", single roll 24"x24" and 18"x16" Sullivan BIT SHARPENER * TURBO-GENERATOR 500 K.W. 275 volt DC * ROPE & BUTTON CONVEYOR 400' long * LATHES, PLANERS, SHAPERS and BORING MILLS

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Super-Quality Machine-Reconditioned—not ordinary Relayers.

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Every effort will be made to take care of your emergency requirements.

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L. B. FOSTER CO.

PITTSBURGH - CHICAGO - NEW YORK

TRANSFORMERS

Outdoor, Oil Cooled, 1 Phase, 60 Cycle

3—125 KVA WEM SK 2200 220/440
3— 75 KVA G.E. H—KS 2300 230/460
3— 75 KVA G.E. H K 2300 230/460
3—100 KVA G.E. H KDD 6900/11500 115/230
2— 50 KVA G.E. H N 6600/11400 115/230/460
3—100 KVA PITTSBURGH 22000 220/440
3— 50 KVA PITTSBURGH 2300 115/230
1—200 KVA WEM & ST 4150 460 3 phase
2— 37.5 KVA WEM S 440 110/220
3— 37.5 KVA WEM S 2300 115/230
3— 37.5 KVA PITTSBURGH 2300 230/460
3—150 KVA G.E. H KS 2300/1100 230/460
1—100 KVA WEM SK 4200 115/230
1—100 KVA WEM SK 2300 230/460
2—100 KVA G.E. H KS 4200 230/460
1— 50 KVA WEM SK 4000 110/220
10— 25 KVA G.E. HK 2300 230/460
5— 37.5 KVA G.E. H 1100/2200 244/488
3— 20 KVA G.E. H 1100/2200 122/244
1— 37.5 KVA G.E. H 1100/2200 122/244
3— 50 KVA G.E. H 1100/2200 122/244

This is only a partial stock.

Many other ratings, larger and smaller, in various voltages.

PENN ELECTRICAL ENGINEERING CO. SCRANTON, PA.

COAL STRIPPING CONTRACTORS ATTENTION

STEEL WIRE CABLE FOR SALE

1—⅜" dia. **IND. WIRE ROPE CENTER, IMPROVED PLOW STEEL 6x19 for DRAGLINES, SHOVELS and etc.**
Lengths from 1000 ft. to 2000 ft. each reel.
Immediate shipment. Priced right for quick sale.
Other sizes in stock.

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A VIBRATING SCREEN

Produces six sizes of coal, complete with motor. Price $500.00. Cost $1800.00. Location Southwestern Pennsylvania.

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All sections of rails and good serviceable second hand cars, all gauges, also spikes, bolts, frogs, switches and ties.

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Model "L" 80 Allis Chalmers, with Baker hydraulic bulldozer, blade 10½', by 4'; 20" track, six speeds forwards, sleeve cylinders, electric starter and equipment, thoroughly modern, almost new. Price $1850:
Also Caterpillar "35s" $395; "65" size $795.

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IMMEDIATE DELIVERY

500 Tons Flats

Sizes run—⅜" to 2" Thick, 1" to 8" Wide, 12 to 24' Long.

Interested in selling any part or all.

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65000 Linear feet **60 lb. A.S.C.E. section,** 30 foot lengths, 16900 feet of rail, drilling 1-15/16" x 6" (6" x 4" x 6"), 48600 feet of rail, drilling 3-7/16" x 5" (5" x 7" x 5"). Full quota angle splice bars to match.

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15 #8 turnouts. (Frogs - Switches, guard rails, stands.)

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1—**100 Kw.** G.E. converting equipment for 2300/275 volt service
1—**200 Kw.** G.E. converter equipment for 13200/600 volt service
1—**500 Kw.** G.E. converter, 600 volts DC, with or without trans.
Motors—AC & DC, large selection
House Meters—500 in stock, recal.
Oil Circuit Breaker—3 S.P.S.T., 300 amp, 35000 volt
Compressor—Air, portable, 7x7", on trucks for 42" gauge track

R. H. BENNEY EQUIPMENT CO.
5024 Montgomery Rd., Norwood, O.

This Searchlight Section

of COAL AGE

is an index of reliable sources for Used and Resale coal mining equipment now available. Consult the *Searchlight Section* in following issues for later offerings.

If you don't see what you want—ask for it. Ask the advertisers. They are constantly adding to their stocks and may have acquired just what you need. Or, shall we ask them for you?

And, when you have special items to dispose of, use the Searchlight Section of Coal Age to help you locate buyers. . . . Send a list of your equipment and we will gladly give full space and rate information.

Departmental Staff

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330 W. 42nd St., New York

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Immediate Delivery:
7, 30-yd. Western
16, 24-yd. Koppel
17, 20-yd. Koppel
3, 20-yd. Western
24, 16-yd. Western
15, 16-yd. Kilbourne & Jacobs

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OTHER TYPES OF CARS TOO
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STEEL TIPPLE

Three track Roberts and Schaffer steel tipple with Marcus shaker screen and loading boom, 150 to 200 ton capacity.

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1—7' x 55' single shell.
1—8'6" x 86' double shell.
Excellent condition, immediate delivery.

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Lansdowne Theatre Building Lansdowne, Pa.

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CAP PIECES

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Desirable Electric Equipment—Prompt Shipment From Our Warehouse

750 KW TURBINE
Westinghouse Mixed Pressure 110# H.P. 2 to 4# L.P. 3600 RPM with gear box to 900 RPM, with accessories.
(Formerly connected to 750 KW 250 v. 900 RPM Gen.)

SYN. MOTORS 3 ph. 60 cy.

HP	Make	V.	Speed
350	Al. Ch.	2200	600
2—175	Westgh.	2200	600
2— 75	Westgh.	2200	900
75	Westgh.	220	1800

M-G SETS 3 ph. 60 cy. (Syn.)
150 KW West. 550 v. DC 2200 v. AC—1200 RPM
3—150 KW G.E. 550 v. DC 2200 v. AC 1200 RPM .8 PF
2—100 KW G.E. 250 v.—2300/4000 v. 1200 Rev. 70% P.F.
100 KW Ridgway 275 v. DC 2200 v. AC—1200 RPM
90 KW Al. Ch. 250 v. 2200 v. AC 900 RPM
75 KW West. 250 v. DC 2200 v. AC 900 RPM

LOCOMOTIVES
5 Ton Jeffrey Storage Battery 42 to 44" Ga. 2 BB motors, Battery box on top
5 Ton Bald-West. 250 v. 40" Ga.
6 Ton Whitcomb 250 v. 40" Ga.
1—4½ Ton Westgh. 36" Ga. 250 v. with reel

MINING MACHINES
2—CE 7 Sullivan DC Standard 30 HP
112 G3 Goodman AC Universal 220/3/60 36-42" Ga.

SLIP RING & SQ. CG. MOTORS (3 ph. 60 cy.)

HP	Make	Speed	Wdg.	Type
750	Cr. Wh.	250	S.R.	601
700	G.E.	393	S.R.	MT 432
400	West.	500	S.C.	CS
300	West.	490	S.C.	CS
200	West.	580	S.R.	CW
200	Cr. Wh.	440	S.R.	28
200	G.E.	700	S.R.	IM
200	Al. Ch.	600	S.C.	
150	West.	720	S.C.	CS
125	Al. Ch.	435	S.R.	
100	G.E.	720	S.C.	I K
100	F.M.	600	S.C.	BB
75	West.	870	S.R.	CW752C
75	G.E.	690	S.R.	I M
75	West.	690	S.R.	CW
75	West.	575	S.R.	CW868A

AIR COMPRESSORS
846 cu. ft. 65# Ing. Rand 2 stage ERI
550 cu. ft. 100# Bury 2 stage
400 cu. ft. 50# Bury 16 x 10
355 cu. ft. 100# Pres. Laidlow Dunn Gordon
225 cu. ft. 100# Sullivan WK 26, portable
160 cu. ft. Chic. Pneu. 100#
140 cu. ft. Gardner Rix 100#

CENTRIFUGAL PUMPS (Direct Motor Driven)
700 GPM 277' DeLaval—75 HP Westgh. Syn.
1—260 GPM 277' Manistee—30 HP Westgh.
2—800 GPM 95' Head Union Steam Pumps.
600 GPM 78' head. Union Steam 25 P GE KET 1200 RPM A.C.

ENGINE GENERATOR SETS
100 KW 250 v. DC Westgh.—Skinner Engine
100 KW 250 v. DC Westgh.—Cooper Bessemer Oil

HOIST
75 HP Ottumwas sgl. fr. drum 36" Dia. 30" wide 8" flanges geared 75 HP CI Westgh. slip ring motor with rev. drum control
75 HP Lidgerwood sgl fr. drum
50 HP Diamond 2 drums same Shaft
30 HP Clyde sgl. drum AC Motor
25 HP Thomas sgl. drum AC Motor
15 HP Lidgerwood sgl. dr. AC Motor

DC MOTORS (230 Volts)

HP	Make	Speed	Type
75	West.	1700	SK
40	West.	750	SK-153
30	West.	600	S-9
25	West.	875	SK
25	West.	600	SK-130
20	West.	900	SK-100L
15	West.	1200	SK
7½ (24)	G.E.	825	CVC

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PITTSBURGH, PENNSYLVANIA

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TRANSFORMERS WANTED

in operating condition or burnt out. Mail us list giving complete nameplate data and stating condition.

We Rewind, Repair and Redesign all Makes and Sizes
ALL TRANSFORMERS GUARANTEED FOR ONE YEAR
Write for Catalog No. 136-B

THE ELECTRIC SERVICE CO., INC.
"AMERICA'S USED TRANSFORMER CLEARING HOUSE"
STATION M Since 1912 CINCINNATI, OHIO

ELECTRIC LOCOMOTIVES

1—10 ton Jeffrey, MH 110 Motors
2—10 ton Westinghouse, 907C motors
2— 8 ton Jeffrey, 906B motors
3— 6 ton Jeffrey, MH 88 motors
1— 5 ton Goodman, with type 33 motors

MINING MACHINES

1—29C Jeffrey, 250 volt permissible
1—35BB Jeffrey, 250 volt permissible
1—212G3 Goodman Low-vein A.C.
1—12G3 Goodman Standard A.C.
1—12AA Goodman, 250 volt
1—36B Jeffrey Low-vein, 250 volt D.C.

SUB STATION

1—200 KW Westinghouse Rotary Converter, 250 volt D.C. with 2300 volt Transformers.
1—150 KW Westinghouse Motor Generator Set, 275 volts D.C. 3/60/2200 volts.
1—100 KW G.E. Motor Generator Set.

MINE CARS

100—42" gauge mine cars, some with roller bearings, 16 and 18" wheels.

We have in stock most any type of coal mining equipment you may desire.

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In Light Weight, Standard or Heavy

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NAT'L STOCK YDS (ST CLAIR CO) ILL.

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AIR COMPRESSORS—DIESELS—PUMPS

Some Steam Engines and Boilers available only slightly above the metal price

BRADFORD SUPPLY COMPANY
WAYNE, WOOD COUNTY, OHIO Near Toledo

AC MOTORS
75 H.P. 1800, 3/60/220, Gen. Elec. slip ring
100 H.P. 1200, 3/60/220, Gen. Elec. synchronous
400 H.P. 500, 3/60/2300, West'house slip ring

AC GENERATORS
15 KW. 1800, 3/60/480, General Elec. TAB
100 KVA. 1200, 3/60/220, General Elec. ATI

DC GENERATORS
30 KW. 220 volt, 825 RPM. Sprague
65 KW. 230 volt, 900 RPM. Sprague
130 KW. 230 volt, 550 RPM. Crocker-Wheeler

MG SET
75 KW. 125 v. DC Ideal 3/60/440 v. AC motor

CENTRIFUGAL PUMP
5" Fairbanks Morse Fig. 100 NS 900 GPM. direct connected 100 H.P. Sterling gasoline engine

ENGINE-GENERATORS
75 & 150 KW. 250 volt DC Crocker-Wheeler gen. direct connected Russell steam engines

AIR COMPRESSOR
625 CFM. 8x10x14 Bury class CCB two stage

Rockford Electric Equipment Co.
711 South Wyman St. Rockford, Illinois

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S-D "AUTOMATIC"
MINE CARS

More than a BARGAIN —they're a "STEAL" at our asking price.

Approximately 250 composite cars. Ideal for opening small mines. Built for 42 Ga. track, all roller bearing wheels. Approximate size: Cap. 42.6 cu. ft., height, 26½", length 8 ft. All cars used through July 1941. Offered subject to prior sale. Write or wire for complete details.

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Locomotives—Mining Machines
Pumps—Motors—Transformers
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Miscellaneous Mine Equipment

Our own modern machine shop is available to repair and modernize your equipment.

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USED PIPE
Low Prices — Quality Pipe
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